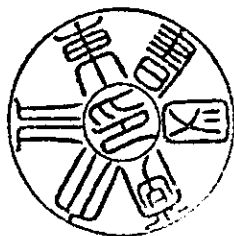


未踏数学の開拓と情報発信の高度化

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URL	http://hdl.handle.net/10097/39688



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(課題番号 15204003)

平成15年度～平成18年度科学研究費補助金(基盤研究(A))
研究成果報告書

平成19年3月

研究代表者 西 川 青 季
(東北大学大学院理学研究科教授)

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1 はしがき

二十世紀において、数学は理工学や情報科学など自然科学の諸分野のみならず、医学・経済学・心理学などの分野においても必要不可欠な研究手段となり、これらの諸科学を結びつける要（共通の研究手段）として重要な役割を果たしてきた。数学のこのような役割は、二十一世紀に入り益々その重要性を増してきている。

このような状況の下、基礎科学としての数学の研究においては、二十世紀の研究における極度な抽象化や過度な分業化を避け、科学技術や社会科学における応用を見据えた研究を、既存の理論の枠組みを越え総合的に推進することが喫緊の課題となっている。

いいかえると、二十世紀後半に残された未解決問題や、二十一世紀の諸科学を結びつける要となる新理論（以下これらを未踏数学とよぶ）を、創始・開拓することが緊急の課題となっている。本研究課題は、現在世界の第一線で指導的立場にある研究者を、個々の専門分野の境界を越えて有機的に結集し、共同研究や研究情報の交換を集約的に行うことにより、このような未踏数学の研究の基盤を築くことを目的に遂行された。

とくに、**Advanced Studies in Pure Mathematics** のシリーズの刊行を軸に、わが国で得られたこのような未踏数学に関する研究成果を、高度な研究情報として迅速に世界に発信し、基礎科学としての数学の新しい展開に向けて、問題提起を継続的に行うことを目指した。

この目的のために、本研究課題で行った主要なプロジェクトは次の通りである。

1. 未踏数学の開拓に関して

- (a) 4つの国際研究集会の開催
- (b) 4つの国内研究集会の支援
- (c) 「21世紀の数学－幾何学の未踏峰－」の出版

2. 情報発信の高度化に関して

- (a) 12の国際研究集会のプロシーディングスの刊行
- (b) 数学ジャーナルの電子化を推進するためのワークショップの開催
- (c) **Advanced Studies in Pure Mathematics** のホームページの整備
- (d) **Advanced Studies in Pure Mathematics** のオンライン編集システムの整備
- (e) **Advanced Studies in Pure Mathematics** の既刊分のデジタル化
- (f) **Advanced Studies in Pure Mathematics** のクラスファイルの作成
- (g) 幾何学分会のホームページの整備とサーバーの更新

これらのプロジェクトを通して、個々の専門領域や大学組織間の境界を越えた研究を推進し、わが国における数理科学の研究の進展と、この分野での国際貢献および研究成果の発信に貢献することが出来た。

本研究課題の遂行にあたり、研究分担者として協力いただいた方々、またそれぞれのプロジェクトの責任者となっていたいただいた方々に、深く感謝いたします。

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西川青季

2 研究組織

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野 口	潤次郎	(東京大学 大学院数理科学研究科 教授)
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研究分担者 (平成 17 年度)

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野 口	潤次郎	(東京大学 大学院数理科学研究科 教授)
宮 岡	洋 一	(東京大学大学院数理科学研究科 教授)
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橋 本	喜一朗	(早稲田大学 理工学部 教授)
谷 崎	俊 之	(大阪市立大学 大学院理学研究科 教授)
坂 内	英 一	(九州大学 大学院数理学研究院 教授)

研究分担者 (平成 18 年度)

新 井	仁 之	(東京大学 大学院数理科学研究科 教授)
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野 口	潤次郎	(東京大学 大学院数理科学研究科 教授)
宮 岡	洋 一	(東京大学 大学院数理科学研究科 教授)
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橋 本	喜一朗	(早稲田大学 理工学部 教授)
谷 崎	俊 之	(大阪市立大学 大学院理学研究科 教授)
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3 交付決定額

(金額単位：千円)

	直接経費	間接経費	合計
平成 15 年度	9,400	2,820	12,220
平成 16 年度	7,900	2,370	10,270
平成 17 年度	8,500	2,550	11,050
平成 18 年度	9,000	2,700	11,700
総計	34,800	10,440	45,240

4 研究成果概要

4.1 平成 15 年度

1. 未踏数学に関する研究プロジェクト「フィンスラー多様体への調和写像の理論の構築」を立ち上げ、平成 15 年 8 月から 9 月にかけて東北大学において共同研究を行い、その成果をもとに平成 16 年 3 月 4 日から 3 月 7 日にかけて国際研究集会「Workshop on Differential Geometry」を開催した。
2. 平成 15 年 8 月に開催された「第 50 回微分幾何学シンポジウム」のプロシーディングスを編集した。
3. Advanced Studies in Pure Mathematics, Volume 33 から Volume 37 を、国内外の 22 研究機関に寄贈した。
4. わが国から多くの重要な学術雑誌が数学分野において発行されているが、その電子ジャーナル化は遅れている。このような現状を打開するため、国立情報学研究所ならびに東北大学付属図書館および同大学院理学研究科数学専攻と共催で、数学分野の学術雑誌の電子ジャーナル化を促進するための研究集会「Workshop on Project Euclid」を、平成 16 年 1 月に東北大学において開催した。図書館関係者を含め国内の主要な数学雑誌編集担当者 54 名が参加した。

4.2 平成 16 年度

1. 幾何解析学の分野で目覚ましい業績を上げている国内外の若手研究者を招聘し、未解決問題の今後の展望を検討するための国際研究集会「Workshop on Geometric Analysis」を、平成 16 年 2 月 21 日から 24 日にかけて東北大学において開催した。
2. 幾何学の分野における未解決問題をまとめた「21 世紀の数学－幾何学の未踏峰」を編集し、出版した。
3. Advanced Studies in Pure Mathematics, Volume 38 から Volume 42 を刊行し、国内外の 22 研究機関に寄贈した。
4. Advanced Studies in Pure Mathematics のホームページを整備した。
5. 数学の学術雑誌においては、電子ジャーナル化だけではなく、バックファイルについても遡及的にデジタル化しインターネット上で自由に利用できるように公開することが喫緊の課題である。そこで東北大学付属図書館および同大学院理学研究科数学専攻と共催で、研究集会「Open Forum on Digital Publication and Digital Library」を、平成 17 年 1 月に東北大学において開催した。
6. 第 51 回幾何学シンポジウムの開催を支援した。

4.3 平成 17 年度

1. Advanced Studies in Pure Mathematics シリーズの編集作業をオンライン上で行うためのシステムとして、「PDF Web 配信システム」を構築した。
2. 第3回日仏特異点シンポジウムのプロシーディングス「Singularities in Geometry and Topology-Sapporo 2004」を Advanced Studies in Pure Mathematics シリーズから出版するため、最終原稿の TeX 入力を行った。
3. Advanced Studies in Pure Mathematics シリーズの既刊 42 巻のうち、初期に出版されたものは現在すでに入手不可能な状態にある。これら初期に出版されたものを pdf ファイルとしてデジタル化し、インターネット上で利用できる形に整えた。
4. 幾何学の分野における研究情報の発信を高度化するため、研究者メーリングリストおよびウェブサイトとして利用されている幾何学学科会のホームページのサーバーを更新し、ホームページのデザインを一新するとともに、英語版ホームページを立ち上げた。
5. 複素フィンスラー幾何学の他分野への応用に関する総合研究「複素フィンスラー幾何学とその応用」を推進するため、研究集会「Differential Geometry, Sendai 2006」を、平成 18 年 2 月 9 日に東北大学において開催した。
6. 部分多様体論の分野における未解決問題を検討するため、研究集会「部分多様体論・湯沢 2005」を、平成 17 年 11 月 23 日から 11 月 25 日にかけて開催した。
7. 第 52 回幾何学シンポジウムの開催を支援した。

4.4 平成 18 年度

1. Advanced Studies in Pure Mathematics シリーズの編集作業の効率化を図るため、TeX による原稿入力のガイドラインを更新し、そのためのクラスファイルを新規に作成した。
2. Advanced Studies in Pure Mathematics, Volume 43 から Volume 46 を刊行し、国内外の 22 研究機関に寄贈した。
3. 第3回日仏特異点シンポジウムのプロシーディングス「Singularities in Geometry and Topology-Sapporo 2004」(ASPM 第 46 巻)を完成し、国内外の 30 研究機関に寄贈した。
4. 未踏数学に関する研究プロジェクト「フィンスラー多様体への調和写像の理論の構築」を推進するため、研究集会「Geometric Analysis, Sendai 2007」を、平成 19 年 1 月 13 日から 1 月 15 日にかけて仙台国際センターにおいて開催した。
5. 部分多様体論の分野における未解決問題を検討するため、研究集会「部分多様体論・湯沢 200」を、平成 18 年 11 月 29 日から 12 月 1 日にかけて開催した。
6. 幾何学の分野における研究情報の発信を高度化するため、研究者メーリングリストおよびウェブサイトを管理している幾何学学科会のサーバーの更新を完成した。

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2. 新井仁之, ウェーブレットと錯視, ビデオ全 1 巻, 放送大学教育振興会, 2006.
3. K. Hashimoto (with K. Miyake and H. Nakamura (Editors)), Galois Theory and Modular Forms, Kluwer Acad. Publ., 2003, 406pp.
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5. 河野俊丈, 反復積分の幾何学, シュプリンガーフェアラーク東京, 280pp, 2007 年刊行予定.
6. 谷崎俊之, 非可換環, 岩波書店, 2006, 148pp.
7. 西川青季, 幾何学的変分問題, 岩波書店, 2006 年, 220pp.
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6 研究集会

6.1 「Workshop on Differential Geometry at Matsushima」記録

「Workshop on Differential Geometry at Matsushima」のご案内

平成 15 年度科学研究費補助金（基盤研究 (A)(1) 「未踏数学の開拓と情報発信の高度化」(研究代表者 西川青季)）の研究計画の一環として下記要領でワークショップを開催しますので、ご案内申し上げます。

日程： 3月4日（木）-3月7日（日）

会場： ホテル松島大観荘

（宮城県宮城郡松島町字犬田 10-76 ・電話 022(354)2161（代））

交通アクセス

JR の場合 仙台駅にて仙石線（地階）へ乗り換え、下り石巻方面の電車に乗車し「松島海岸駅」下車。仙台-松島海岸間は快速で約 30 分、普通で 40 分。料金は片道 400 円。なお、新幹線中央出口へ向かわれますと、改札を出ることなく乗換えができます。仙台駅構内図の URL を下に記しますので乗り換えの際のご参考にしてください。
<http://www.ecomo-rakuraku.jp/guide/21044.html>

空路の場合 仙台空港から、
(1) 仙台空港バスターミナル 3 番のりばより、松島行きの定期バス（日本三景交通）にて「松島海岸駅」降車。仙台空港-松島海岸駅間は約 60 分-70 分。料金は片道 1,500 円（3 日前までに予約が必要。電話 022-354-5151）。バスの運行時刻等については下記 URL をご参照ください。
<http://www.tabi-bus.co.jp/main.htm>
(2) 仙台空港バスターミナル 1 番のりばより、エアポートリムジンバスにて仙台駅で一旦降車（仙台空港-仙台駅間約 40 分）。料金は片道 910 円。その後は JR 仙石線（上述）で松島海岸駅下車。

JR 仙石線「松島海岸駅」からホテルまでは、14:00-18:00 の時間帯であれば、電車の到着時刻にあわせて送迎バスが待機していますのでご利用ください。

ホテルに関するその他の情報につきましては下記 URL をご参考ください。

<http://www.taikanso.co.jp/>

世話人： 上野慶介 (山形大学理学部), 鎌田博行 (宮城教育大学教育学部)

Program

March 4(Thu.) [Room: Suehiro]

- | | |
|-------------|--|
| 15:15–15:45 | Registration |
| 15:45–16:00 | Opening Meeting |
| 16:00–17:00 | Udo Simon (TU berlin)
Centro-affine Bernstein problem |
| 17:00–17:30 | Discussion/Break |

March 5(Fri.) [Room: Suehiro]

- | | |
|-------------|--|
| 9:30–10:30 | Paul Baird (University of Brest)
Einstein metrics, harmonic morphisms and biconformal deformations |
| 10:30–11:00 | Discussion/Break |
| 11:00–12:00 | Shin Nayatani (Nagoya University)
Combinatorial harmonic maps and discrete-group actions on $CAT(0)$ spaces |
| 12:00–12:30 | Discussion/Break |
| 12:30–14:00 | Lunch |
| 14:00–15:00 | Takashi Kurose (Fukuoka University)
Geometry of statistical manifolds |
| 15:00–15:30 | Discussion/Break |
| 15:30–16:30 | Udo Simon (TU Berlin)
Relative hypersurface theory revisited: Gauge invariant structures |
| 16:30–17:00 | Discussion/Break |
| 17:00–17:30 | Hiroshi Matsuzoe (Saga University)
Traceless cubic forms on statistical manifolds and conformal-projective geometry |
| 17:30–18:00 | Discussion/Break |

March 6(Sat.) [Room: Godai]

- | | |
|-------------|--|
| 9:30–10:30 | Seiki Nishikawa (Tohoku University)
Harmonic maps in complex Finsler geometry |
| 10:30–11:00 | Discussion/Break |
| 11:00–12:00 | Tadashi Aikou (Kagoshima University)
Projectively-flat complex Finsler metrics |
| 12:00–12:30 | Discussion/Break |
| 12:30–14:00 | Lunch |
| 14:00–15:00 | Tom Wan (Chinese University of Hong Kong)
Hyper-Lagrangian submanifolds in hyper-Kaehler manifolds and
mean curvature flow |
| 15:00–15:30 | Discussion/Break |
| 15:30–16:30 | Paul Baird (University of Brest)
Evolution of the scalar curvature of a surface to a prescribed function |
| 16:30–17:00 | Discussion/Break |
| 17:00–17:30 | Keisuke Ueno (Yamagata University)
Eigenmaps and immersions between spheres |
| 17:30–18:00 | Discussion/Break |

March 7(Sun.)

- | | |
|------------|-----------------|
| 9:30–10:00 | Closing Meeting |
|------------|-----------------|

WORKSHOP ON DIFFERENTIAL GEOMETRY
at Matsushima
March 4–7, 2004

List of Participants

Tadashi Aikou(Kagoshima University)
Paul Baird(University of Brest)
Hitoshi Furuhashi(Hokkaido University)
Jun-ichi Inoguchi(Utsunomiya University)
Hiroyasu Izeki(Tohoku University)
Hiroyuki Kamada(Miyagi University of Education)
Takashi Kurose(Fukuoka University)
Koji Matsumoto(Yamagata University)
Hiroshi Matsuzoe(Saga University)
Adela Mihai(University of Bucharest(Yamagata University))
Shin Nayatani(Nagoya University)
Seiki Nishikawa(Tohoku University)
Udo Simon(TU Berlin)
Keisuke Ueno(Yamagata University)
Tom Wan(Chinese University of HongKong)

6.2 「Workshop on Project Euclid」記録



Workshop on Project Euclid : January 23, 2004

Program

Venue: Conference Room (Room #501), 5th floor, Aoba Memorial Hall, Tohoku University

Friday January 23, 2004

14:00 Opening - Mr. OBA, NII

Welcome - Professor ADACHI, NII

14:10 SPARC/JAPAN - Professor ADACHI, NII

14:30 Project Euclid - Mrs. Teresa EHRING, Director of Electric Publishing, Cornell University

Mr. David RUDDY, Interim Coordinator, Cornell University

15:45 SPARC/JAPAN PARTNERS - Professor NISHIKAWA, Tohoku University

Professor FUTAKI, Tohoku University

16:00 Q & A

16:45 closing

17:00 Welcome Party (Room #702), 7th floor, Aoba Memorial Hall

Project Euclid 説明会：2004 年 1 月 23 日

プログラム

会場：東北大学 青葉記念会館 5 階 大会議室 (501)

2004 年 1 月 23 日 (金)

14:00 開会 - 大場課長 (NII)

挨拶 - 安達教授 (NII)

14:10 SPARC/JAPAN 事業の紹介 - 安達教授 (NII)

14:30 Project Euclid 紹介 - テレサ・イーリング氏 (コーネル大学)

デイビッド・ラディ氏 (コーネル大学)

15:45 2003 年度 SPARC/JAPAN 選定誌から - 西川教授 (東北大学)

二木教授 (東京工業大学)

16:00 質疑

16:45 閉会

17:00 懇親会 (会場：青葉記念会館 7 階 702)



Workshop on Project Euclid : January 23, 2004

List of Participants

Venue: Conference Room (Room #501), 5th floor, Aoba Memorial Hall, Tohoku University

出席者	Participants
行木 孝夫 北海道大学理学研究科助手	Mr. NAMIKI Takao, Professor, Graduate School of Science, Hokkaido University <i>Hokkaido Mathematics Journal</i>
阿部 綾子 北海道大学理学研究科	Ms. ABE Ayako, Professor, Graduate School of Science, Tohoku University <i>Hokkaido Mathematics Journal</i>
保科 隆雄 筑波大学数学系教授	Mr. HOSHINA Takao, Professor, Institute of Mathematics, University of Tsukuba <i>Tsukuba Journal of Mathematics</i>
気谷 陽子 筑波大学図書館部情報管理課課長補佐	Ms. KITANI Yoko, Library, University of Tsukuba
長澤 壯之 埼玉大学理学部教授	Mr. NAGASAWA Takeyuki, Professor, Faculty of Science, Saitama University <i>Saitama Mathematical Journal</i>
倉橋 とき子 埼玉大学附属図書館情報管理課雑誌情報係長	Ms. KURAHASHI Tokiko, Library, Saitama University
京藤 貴 千葉大学附属図書館情報管理課長	Mr. KYOTO Tboru, Library, Chiba University
片岡 清臣 東京大学数理科学研究科教授	Mr. KATAOKA Kiyoomi, Professor, Graduate School of Mathematical Sciences, University of Tokyo <i>Journal of Mathematical Sciences, the University of Tokyo</i>
高橋 努 東京大学附属図書館総務課企画渉外掛長	Mr. TAKAHASHI Tsutomu, Library, University of Tokyo
二木 昭人 東京工業大学理工学研究科教授	Mr. FUTAKI Akito, Professor, Graduate School of Science, Tokyo Institute of Technology <i>Kodai Mathematical Journal</i>
三好 重明 中央大学理工学部	Mr. MIYOSHI Shigeaki, Professor, Graduate School of Science, Chuo University <i>Tokyo Journal of Mathematics</i>
一楽 重雄 横浜市立大学総合理学研究科教授	Mr. ICHIRAKU Shigeo, Professor, Graduate School of Integrated Science, Yokohama City University <i>Yokohama Mathematical Journal</i>
竹内 照雄 新潟大学理学部助教授	Mr. TAKEUCHI Teruo, Associate Professor, Faculty of Science, Niigata University <i>Nihonkai Mathematical Journal</i>

木村 歳 富山大学理学部助手	Mr. KIMURA Iwao, Research Associate, Faculty of Science, Toyama University <i>Mathematics Journal of Toyama University</i>
木村 優 富山大学附属図書館情報サービス課長	Mr. KIMURA Masaru, Library, Tohoku University
小崎 和子 名古屋大学多元数理科学研究科	Ms. KOZAKI Kazuko, Graduate School of Mathematics, Nagoya University <i>Nagoya Mathematical Journal</i>
竹井 義次 京都大学数理解析研究所助教授	Mr. TAKEI Yoshitsugu, Associate Professor, Research Institute for Mathematical Sciences, Kyoto University <i>Publications of the Research Institute for Mathematical Sciences</i>
伊吹山 知義 大阪大学理学研究科教授	Mr. IBUKIYAMA Tomoyoshi, Professor, Graduate School of Science, Tohoku University <i>Osaka Journal of Mathematics</i>
高山 信毅 神戸大学理学部教授	Mr. TAKAYAMA Nobuki, Professor, Faculty of Science, Kobe University <i>Funkcialaj Ekvacioj</i>
中西 康剛 神戸大学理学部教授	Mr. NAKANISHI Yasutaka, Professor, Faculty of Science, Kobe University <i>Kobe Journal of Mathematics</i>
島川 和久 岡山大学理学部教授	Mr. SHIMAKAWA Kazuhisa, Professor, Faculty of Science, Okayama University <i>Mathematics Journal of Okayama University</i>
吉野 正史 広島大学理学部教授	Ms. YOSHINO Masafumi, Professor, Faculty of Science, Hiroshima University <i>Hiroshima Mathematical Journal</i>
吉田 正章 九州大学数理学研究院教授	Ms. YOSHIDA Masaaki, Professor, MATHEMATICS Graduate Courses, Kyushu University <i>Kyushu Journal of Mathematics</i>
市来 陽子 社団法人日本数学会	Ms. ICHIKI Yoko, The Mathematical Society of Japan <i>Journal of the Mathematical Society of Japan</i>
阿部 義人 日本金属学会	Mr. Abe Yoshito, The Japan Institute Metals <i>MATERIALS TRANSACTION</i>
千葉 博紀 日本金属学会	Mr. CHIBA Hiroki, The Japan Institute Metals <i>MATERIALS TRANSACTION</i>
岩田 真一 紀伊國屋書店出版部	Mr. IWATA Shinichi, Kinokuniya Company

西川 青季 東北大学理学研究科教授	Mr. NISHIKAWA Seiki, Professor, Graduate School of Science, Tohoku University <i>Tohoku Mathematical Journal</i>
石田 正典 東北大学理学研究科教授	Mr. ISHIDA Masanori, Professor, Graduate School of Science, Tohoku University
高木 泉 東北大学理学研究科教授	Mr. TAKAGI Izumi, Professor, Graduate School of Science, Tohoku University
森田 康夫 東北大学理学研究科教授	Mr. MORITA Yasuo, Professor, Graduate School of Science, Tohoku University
竹田 雅好 東北大学理学研究科教授	Mr. TAKEDA Masayoshi, Professor, Graduate School of Science, Tohoku University
小田 忠雄 東北大学名誉教授	Mr. ODA Tadao, Professor Emeritus, Tohoku University
佐山 淳子 東北大学理学研究科技官	Ms. SAYAMA Junko, Secretary, Graduate School of Science, Tohoku University
浦川 肇 東北大学情報科学研究科教授	Ms. URAKAWA Hajime, Professor, Graduate School of Information Sciences, Tohoku University <i>Interdisciplinary Information Sciences</i>
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松井 好次 東北大学附属図書館情報サービス課図書館専門員	Mr. MATSUI Koji, Library, Tohoku University
米澤 誠 東北大学附属図書館情報企画掛長	Mr. YONEZAWA Makoto, Library, Tohoku University
照内 弘通 東北大学附属図書館情報企画掛	Mr. TERUUCHU Hiromichi, Library, Tohoku University
尾田 陽子 東北大学附属図書館北青葉山分館	Ms. ODA Yoko, Library, Tohoku University
及川 恵美子 東北大学金属材料研究所図書掛長	Ms. OIKAWA Emiko, Library, Tohoku University
小澤 史子 東北大学多元物質科学研究所図書室	Ms. OZAWA Fumiko, Library, Tohoku University
遠藤 みつ子 東北大学サイクロトロン IR センター図書室	Ms. ENDO Mitsuko, Library, Tohoku University

テレサ・イーリング コーネル大学図書館	Mrs. Teresa EHLING, Director of Electric Publishing, Cornell University Library
デイビッド・ラディ コーネル大学図書館	Mr. David RUDDY, Head of Systems Development and Production, Electric Publishing, Cornell University Library
安達 淳 国立情報学研究所 (NII) 教授	Mr. ADACHI Jun, Professor, Director, Research Center for Information Resources, NII
渡辺 恵子 国立情報学研究所 (NII) 助教授	Mrs. WATANABE Keiko, Associate Professor, Research Center for Information Resources, NII
大場 高志 国立情報学研究所 (NII) 開発・事業部コンテンツ課長	Mr. OBA Takashi, Director, Contents Division, Development and Operations Department, NII
土屋 俊 千葉大学文学部教授	Mr. TSUCHIYA Shun, Professor, Faculty of Letters, Chiba University

6.3 「第 51 回幾何学シンポジウム」講演要旨（目次）

第 51 回幾何学シンポジウム講演要旨

於 東京都立大学

2004 年 8 月 7 日 ～ 10 日

平成 16 年度科学研究費補助金基盤研究
課題番号 14204002 代表 二木昭人 A(1)
課題番号 15204005 代表 前田吉昭 A(2)
課題番号 16204007 代表 宮岡礼子 A(1)
他
小磯憲史 A(2), 満洲俊樹 A(2), 西川青季 A(1)

2004年8月7日(土)

9:00-10:00	板東重稔(東北大理)	Einstein-Hermitian metrics on stable sheaves	
10:15-11:15	戸田正人(お茶の水女子大理)	Ricci flow と Perelman の仕事	1
11:30-12:30	G. Tian (Princeton Univ.)	TBA	
14:00-15:00	A 本多宣博(東工大理工)	自己双対計量と28本の複接線 (Self-dual metrics and twenty-eight bitangents)	77
	B 前田定廣(joint with 足立俊明)(島根大総合理工)	階数1の対称空間上の幾何学	85
	C 笹原徹(北大理)	Biharmonic maps	101
	D 山瀬尊久(筑波大数理物質科学)	双対 Thurston ノルムと3次元多様体	110
15:15-16:15	A 穴戸雄一(筑波大数理物質科学)	無限次元統計多様体と Poisson 構造の幾何学	118
	B 小野肇(都立大理)	トーリック幾何から見たラグランジュ部分多様体のハミルトン 極小性とハミルトン安定性	124
	C 東條晃次(千葉工大自然)	アファイン対称空間とコンパクト3-対称空間の複素構造 及び全実全測地的部分多様体	132
	D 田中祐二(名大多元数理)	An adiabatic construction of Ω ASD-instantons on Calabi-Yau manifold	138
16:30-17:30	B 酒井高司(都立大理)	積分幾何学による Lagrange 部分多様体の Hamilton 体積最小性	149
	C 谷口正(仙台電波高専)	$N=2$ 超対称 Yang-Mills インスタントンの ADHM 構成	155
	D 山田拓身(阪大理)	A structure theorem of compact complex parallelizable pseudo-Kähler solvmanifolds	163

2004年8月8日(日)

9:00-10:00	芥川和雄 (東京理科大理工)	
	山辺不変量と共形幾何 (Yamabe Invariants and Conformal Geometry)	12
10:15-11:15	戸田正人 (お茶の水女子大理)	
	Ricci flow と Perelman の仕事	1
11:30-12:30	G. Tian (Princeton Univ.)	
	TBA	
14:00-15:00	A 藤原耕二 (東北大理)	
	CAT(0) 空間の等長変換	168
	B 木村真琴 (島根大理工)	
	Lagrangian minimal surfaces in $S^2 \times S^2$	179
	C 松浦望 (福岡大理)	
	離散 KdV 方程式	184
	D 沢井洋 (阪大理)	
	Existence of lattices on completely solvable Lie groups	187
15:15-16:15	B 山田章 (長岡高専)	
	4次元概ハイパーエルミート多様体について	195
	C 許斌 (東工大理工)	
	Some Applications of Harmonic Maps to Compact Transformation Groups on Certain Compact Smooth Manifolds	201
	D 小林真平 (神戸大自然)	
	Coarse classification of constant mean curvature cylinders ...	212
16:30-17:30	B 橋本英哉 (名城大理工)	
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	C 松添博(佐賀大理工)	共形射影構造と Tchebychev 型はめ込み 257
	D 楯辰哉(名大多元数理)	Lattice path combinatorics and asymptotics of multiplicities of weights in tensor powers 262
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	B 川久保哲(福岡大理)	3 次元空間形内の Kirchhoff 弾性棒 288
	C 野田知宣(阪大理)	局所共形 Kähler 多様体の調和葉層について 296
	D 平川信也(東北大理)	2 次元複素空間形内の平行な平均曲率ベクトルをもつガウス曲率一定な曲面について 303
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	C 小磯憲史(阪大理)	極大極小曲面(最大の極小曲面の境界) 318
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2004年8月10日(火)

9:15-10:45	西成活裕(龍谷大理工)	幾何と可積分性、およびその弾性体への応用	55
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	D 野原雄一(名大多元数理)	Projective embeddings and Lagrangian fibrations of Abelian varieties	357
15:15-16:15	B 濱田龍義(福岡大理)	複素空間型内の実超曲面に関する話題から	364
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基調講演

教養部教室棟 120 番教室

パラレルセッション

会場 A: 教養部教室棟 120 番教室

会場 B: 教養部教室棟 110 番教室

会場 C: 教養部教室棟 106 番教室

会場 D: 教養部教室棟 105 番教室

6.4 「Open Forum on Digital Publication and Digital Library」記録

Open Forum on Digital Publication and Digital Library

January 24, 2005

Venue: Conference Room (Room #501), 5th floor, Aoba Memorial Hall, Tohoku University

Monday January 24, 2005

14:00 Opening - Professor NISHIKAWA, Tohoku University

Welcome - NAKATSUKA, Trustee of Tohoku University

14:10 Digital Publishing System (DPubS) Software Project : Open source from Project Euclid -

Mr. David RUDDY, Head of Systems Development and
Production, Electric Publishing, Cornell University

15:00 Q & A

15:15 Digital Mathematics Library and Retrodigitization Projects in US -

Professor Phillippe TONDEUR, University of Illinois at
Urbana-Champaign, former director of the Division of
Mathematical Science (DMS) of the National Science
Foundation (NSF)

16:15 Q & A

16:30 Closing

デジタル出版とデジタル図書館に関する公開フォーラム

2005 年 1 月 24 日

会場：東北大学 青葉記念会館 5 階 大会議室 (501)

2005 年 1 月 24 日 (月)

14:00 開会 - 西川教授 (東北大学)

挨拶 - 中塚理事 (東北大学)

14:10 DPubs : Project Euclid で開発したオープンソースの電子出版システム -

デイビッド・ラディ氏 (コーネル大学)

15:00 質疑応答

15:15 デジタル・マセマティック・ライブラリーと米国における遡及電子化プロジェクト -

フィリップ・トンデュール教授 (イリノイ大学アーバ
ナ・シャンペーン校, 前 NSF 数学部門局長)

16:15 質疑応答

16:30 閉会

Open Forum on Digital Publication and Digital Library

January 24, 2005

List of Participants

Venue: Conference Room (Room #501), 5th floor, Aoba Memorial Hall, Tohoku University

出席者	Participants
大西 仁 東北大学理事, 附属図書館長	Professor. OHNISHI Hitoshi , Trustee of Tohoku University
小野瀬 うた子 東北大学金属材料研究所	Ms. ONOSE Utako , Institute for Materials Research, Tohoku University
内藤 英雄 東北大学附属図書館事務部長	Mr. NAITO Hideo , Library, Tohoku University
諏訪田 義美 東北大学附属図書館総務課長	Mr. SUWADA Yoshimi , Library, Tohoku University
佐藤 正弘 東北大学附属図書館情報管理課長	Mr. SATO Masahiro , Library, Tohoku University
白石 光雄 東北大学附属図書館情報サービス課長	Mr. SHIRAIISHI Mitsuo , Library, Tohoku University
高橋 信野 東北大学附属図書館総務課課長補佐	Mr. TAKAHASHI Shinya , Library, Tohoku University
米澤 誠 東北大学附属図書館情報企画係長	Mr. YONEZAWA Makoto , Library, Tohoku University
永井 伸 東北大学附属図書館情報企画係	Mr. NAGAI Shin , Library, Tohoku University
土田 奈穂子 東北大学附属図書館情報企画係	Ms. TSUCHIDA Naoko , Library, Tohoku University
半澤 智絵 東北大学附属図書館雑誌情報係	Ms. HANZAWA Tomoe , Library, Tohoku University
後藤 敏行 東北大学附属図書館閲覧第一係	Mr. GOTO Toshiyuki , Library, Tohoku University
佐藤 初美 東北大学附属図書館閲覧第二係長	Ms. SATO Hatsumi , Library, Tohoku University
渡邊 愛子 東北大学附属図書館農学分館	Ms. WATANABE Aiko , Agricultural Library, Tohoku University
関戸 麻衣 東北大学附属図書館農学分館	Ms. SEKIDO Mai , Agricultural Library, Tohoku University

6.5 「Workshop on Geometric Analysis」 記録

Workshop on Geometric Analysis

日時：2005年 2月 21日(月)～ 2月24日(木)
場所：東北大学 理学研究科 数学棟 518号室

http://www.math.tohoku.ac.jp/~abreu/Workshop.html

Miguel Abreu (Instituto Superior Tecnico) Mon. 10:40-11:40 & Mon. 2:30-3:30

"Toric Kahler metrics in symplectic coordinates"

Abstract: I will motivate and describe a parametrization for toric Kahler metrics on symplectic $2n$ -manifolds (and orbifolds) equipped with a Hamiltonian n -torus action, using symplectic coordinates and potentials (instead of the more common complex analogues). The relevant properties of this approach will be discussed and illustrated with several explicit examples.

I will then concentrate on the constant and extremal (in the sense of Calabi) scalar curvature equation, motivating its special form in this setting, describing explicit interesting solutions and discussing some of its analytical properties.

Almost all of what will be presented in these two talks is the result of separate work by Guillemin, Abreu and Donaldson.

Jingyi Chen (University of British Columbia) Mon. 4:00-5:00 & Tue. 10:40-11:40

"Some geometric PDEs arising from calibrations"

Abstract: In the first talk, I will discuss mean curvature flows for 2-dimensional symplectic surface in a Kaehler-Einstein surface and Lagrangian submanifolds in a Calabi-Yau n -fold. In the second talk, I will discuss maps between hyperkaehler manifolds, which satisfy a first order system and are related to harmonic maps and minimal surfaces.

Richard Schoen (Stanford University) Tue. 2:30-3:30 & Tue. 4:00-5:00

"Minimal Submanifolds I: Lagrangian volume minimization and special lagrangian submanifolds"

Abstract: In high codimension there are special classes of volume minimizing submanifolds which one would like to construct in general situations. These include special lagrangian submanifolds. In this talk we will describe this class of submanifolds and survey the progress on existence questions via variational methods, mean curvature flow, and gluing methods. We will discuss some of the many open problems in this area.

"Minimal Submanifolds II: On the isoperimetric inequality for minimal surfaces"

Abstract: A longstanding conjecture concerning the geometry of minimal surfaces is that the sharp isoperimetric inequality (relating the area of the surface and its boundary length) should hold in general. In this talk we will survey this problem and present some new methods of attack which solve the problem in general situations. The methods involve a careful analysis of flat cone metrics which are related in a natural way to the minimal surface.

Peter Topping (University of Warwick) Wed. 10:40-11:40 & Wed. 2:30-3:30

"Ricci flow I: A selected survey."

Abstract: I'll describe what the Ricci flow is, and some of the basic theory, including a few ideas of Perelman which are interesting from a geometric analysis point of view.
(Aimed at a general audience who know a bit of Riemannian geometry.)

"Ricci flow II: Singular initial configurations."

Abstract: I'll show how one of the ideas from the 1st talk can be used to prove a compactness theorem for Ricci flows, which gives us some unconventional existence theorems.

Seiki Nishikawa (Tohoku University) Wed. 4:00-5:00

"Harmonic maps into complex Finsler manifolds"

Jiaping Wang (University of Minnesota) Thurs. 10:40-11:40 & Thurs. 2:30-3:30

"Function theory and its applications"

Abstract: Function theory has been successfully applied to derive various geometric and topological information of Riemannian manifolds. In the two talks, I plan to explain some of these aspects and mention a few open problems.

Futoshi Takahashi (Tohoku University) Thurs. 4:00-5:00

"On an isoperimetric inequality for mapping with remainder term"

6.6 「第 52 回幾何学シンポジウム」講演要旨（目次）

第 52 回 幾何学シンポジウム 講演要旨

2005 年 8 月 20 日 (土) - 8 月 23 日 (火)

福岡大学

平成 17 年度科学研究費補助金

代表 小磯憲史 基盤 A

代表 山口孝男 基盤 A

他 西川青季, 金井雅彦, 前田吉昭 (各基盤 A)

2005年度幾何学シンポジウム プログラム

8月20日(土)

9:00 - 10:00	木村 真琴(島根大学理工) Lagrangian submanifolds with some foliation in a complex projective space	1	(1)
10:15 - 11:15	成 慶明(佐賀大学理工) Eigenvalues on compact Riemannian manifolds	2	(6)
11:30 - 12:30	加須栄 篤(金沢大学理) Convergence of metric graphs and energy forms	3	(16)
2:00 - 2:45	(A) 森山 貴之(大阪大学理) Pre-symplectic 多様体における Lefschetz 型 pencil の構成	4	(26)
	(B) 山岡 英孝(京都大学情報) 多体系の層化力学と3体系の境界挙動	5	(34)
	(C) 山瀬 尊久(筑波大学数理物質) Seiberg-Witten理論と幾何構造 $R \times H^2$	6	(40)
3:00 - 3:45	(A) 野田 知宣(大阪大学理) 井上曲面上の調和葉層の安定性について	7	(52)
	(B) 大久保 貴章(埼玉大学理工) CR Weyl 接続について	8	(57)
	(C) 塚本 真輝(京都大学理) 無限エネルギーゲージ理論	9	(67)
4:00 - 4:45	(A) 濱田 龍義(福岡大学理) Ruled real hypersurfaces of complex space forms	10	(75)
	(B) Neil Seshadri(東京大学数理) Volume renormalization for CR and contact geometries	11	(80)
5:00 - 5:45	(A) 永井 節夫(富山大学教育) 非平坦複素空間型内のホップ実超曲面のリッチテンソルと 構造ヤコビ作用素による特徴付け	12	(86)
	(B) Jong Taek Cho(全南大学) Pseudo-hermitian geometry of CR-manifolds of contact type	13	(94)

8月21日(日)

9:00 - 10:00	入谷 寛(京都大学理) Mirror transformation and quantum Lefschetz principle	14 (104)
10:15 - 11:15	高橋 篤史(京都大学数理研) ミラー対称性	15 (121)
11:30 - 12:30	芥川 和雄(東京理科大学理工) 正の山辺計量の判定とその応用	16 (128)
2:00 - 2:45	(A) 小西 由紀子(京都大学数理研) Integrality of Gopakumar-Vafa Invariants of Toric Calabi-Yau Threefolds (B) 沢井 洋(大阪大学理) On a property of compact solvmanifolds (C) 澁谷 一博(北海道大学理) Drapeau theorem for differential systems	17 (136) 18 19 (142)
3:00 - 3:45	(A) 植田 一石(京都大学数理研) ホモロジー的ミラー対称性とMcKay対応 (B) 中川 知巳(筑波大学数理物質) 非コンパクト型対称空間と体積エントロピー (C) Stanislav Dubrovskiy(慶應義塾大学理工) Differential Invariants of Geometric Structures	20 (146) 21 (156) 22 (164)
4:00 - 4:45	(A) 太田 慎一(京都大学理) 測度距離空間におけるリッチ曲率の下限について (B) 酒井 高司(首都大学東京都市教養) 積分幾何学における転送原理	23 (169) 24 (175)
5:00 - 5:45	(A) 松添 博(名古屋工業大学工) 平面2値画像のハウスドルフ距離の線形時間計算アルゴリズム (B) 小野 肇(首都大学東京都市教養) Hamiltonian stability of Lagrangian tori in toric Kähler manifolds	25 (184) 26 (191)

8月22日(月)

9:00 - 10:00	本多 宜博(東京工業大学理工) Twistor spaces of self-dual metrics on $n\mathbb{CP}^2$ with circle action	27	(203)
10:15 - 11:15	亀谷 幸生(慶應義塾大学理工) 1次元ベッチ数が正の場合の10/8-不等式について	28	(215)
11:30 - 12:30	小林 亮一(名古屋大学多元) \mathbb{R}^3 内の完備極小曲面のガウス写像の除外値問題とNEVANLINNA理論	29	(225)
2:00 - 2:45	(A) 飯田 修一(東京大学数理) Adiabatic limits of eta-invariants and Meyer functions	30	(274)
	(B) 加藤 正夫(東北大学情報) Affine minimal ruled hypersurfaces	31	(277)
	(C) 大栗 正弘(東京理科大学理) The classification of 3-dimensional locally homogeneous Blaschke hypersurfaces	32	(284)
3:00 - 3:45	(A) 伊藤 公毅(京都大学理) 楕円曲線上の点配置空間に付随する超幾何積分	33	(290)
	(B) 黒須 早苗(東京工業大学理工) On some properties for the Ricci tensors of a statistical manifold and affine immersions	34	(305)
	(C) 飯島 和人(名古屋大学多元) リーマン多様体の局所等長埋め込みの オブストラクションに関する表現論的手法	35	(315)
4:00 - 4:45	(A) 本間 泰史(東京理科大学理工) Estimating the eigenvalues on Quaternionic Kähler Manifolds	36	(322)
	(B) 古畑 仁(北海道大学理) Affine Immersions and Holomorphic Statistical Structures	37	(332)
5:00 - 5:45	(A) 橋本 英哉(名城大学理工) On the Gauss map of 6-dimensional submanifolds of the octonions	38	(341)
	(B) Costin Vîlcu (Romanian Academy, 熊本大) Farthest and critical point mappings on surfaces	39	(349)

8月23日(火)		
9:00 - 10:00	加藤 毅(京都大学理) ミクロな写像間の相互作用からマクロなパターン形成に向けて	40 (355)
10:15 - 11:15	小谷 元子(東北大学理学研究科) 結晶格子の磁場付き推移作用素	41 (362)
11:30 - 12:30	砂田 利一(明治大学理工) Goemetric Theory of Lattice Vibrations — In centennial commemoration of Einstein's great achievements in 1905 —	42 (365)
2:00 - 2:45	(A) 十文字 正樹(東北大学情報) ラプラス作用素の固有値問題の可視化	43 (371)
	(B) 三鍋 聡司(名古屋大学多元) On certain aspects of string/gauge theory correspondence	44 (386)
3:00 - 3:45	(A) 高橋 淳也(東北大学情報) Riemann 多様体の崩壊と p -form の大きい固有値	45 (389)
	(B) 佐野 友二(北海道大学理) On comparison between balanced metrics and canonical Kähler metrics	46 (403)
4:00 - 4:45	(A) 河合 茂生(佐賀大学文化教育) On the spectrum of the Dirac operator on a noncompact manifold	47 (408)
	(B) 庄田 敏宏(九州大学数理) On triply periodic minimal surfaces in Euclidean space	48 (414)

The 52nd Geometry Symposium Program

August 20, (Sat.)

9:00 – 10:00	Makoto Kimura (Shimane U.) Lagrangian submanifolds with some foliation in a complex projective space	1	(1)
10:15 – 11:15	Qing-Ming Cheng (Saga U.) Eigenvalues on compact Riemannian manifolds	2	(6)
11:30 – 12:30	Atsushi Kasue (Kanazawa U.) Convergence of metric graphs and energy forms	3	(16)
2:00 – 2:45	(A) Takayuki Moriyama (Osaka U.) Construction of Lefschetz type pencils on pre-symplectic manifolds . . .	4	(26)
	(B) Hidetaka Yamaoka (Kyoto U.) Stratified mechanics for many-body systems and boundary behaviors of the three-body system	5	(34)
	(C) Takahisa Yamase (Univ. of Tsukuba) Seiberg-Witten theory and the geometric structure $R \times H^2$	6	(40)
3:00 – 3:45	(A) Tomonori Noda (Osaka U.) On stability for the harmonic foliation on Inoue surfaces	7	(52)
	(B) Takaaki Ohkubo (Saitama U.) On CR Weyl connections	8	(57)
	(C) Masaki Tsukamoto (Kyoto U.) Infinite-Energy Gauge Theory	9	(67)
4:00 – 4:45	(A) Tatsuyoshi Hamada (Fukuoka U.) Ruled real hypersurfaces of complex space forms	10	(75)
	(B) Neil Seshadri (Univ. of Tokyo) Volume renormalization for CR and contact geometries	11	(80)
5:00 – 5:45	(A) Setsuo Nagai (Toyama U.) Characterizations of Hopf real hypersurfaces in non-flat complex space forms by their Ricci tensors and structure Jacobi operators	12	(86)
	(B) Jong Taek Cho (Chonnam National U.) Pseudo-hermitian geometry of CR-manifolds of contact type	13	(94)

August 21, (Sun)

9:00 – 10:00	Hiroshi Iritani (Kyoto U.) Mirror transformation and quantum Lefschetz principle	14	(104)
10:15 – 11:15	Atsushi Takahashi (Kyoto U.) Mirror Symmetry	15	(121)
11:30 – 12:30	Kazuo Akutagawa (Science U. of Tokyo) A criterion of positive Yamabe metrics and its applications	16	(128)
2:00 – 2:45	(A) Yukiko Konishi (Kyoto U.) Integrality of Gopakumar–Vafa Invariants of Toric Calabi–Yau Threefolds	17	(136)
	(B) Hiroshi Sawai (Osaka U.) On a property of compact solvmanifolds	18	
	(C) Kazuhiro Shibuya (Hokkaido U.) Drapeau theorem for differential systems	19	(142)
3:00 – 3:45	(A) Kazushi Ueda (Kyoto U.) Homological Mirror Symmetry and McKay Correspondence	20	(146)
	(B) Tomomi Nakagawa (Univ. of Tsukuba) Symmetric spaces of noncompact type and the volume entropy	21	(156)
	(C) Stanislav Dubrovskiy (Keio U.) Differential Invariants of Geometric Structures	22	(164)
4:00 – 4:45	(A) Shin-ichi Ohta (Kyoto U.) On lower Ricci curvature bounds on metric measure spaces	23	(169)
	(B) Takashi Sakai (Tokyo Metropolitan U.) Transfer principle in integral geometry	24	(175)
5:00 – 5:45	(A) Hiroshi Matsuzoe (Nagoya Inst. of Tech.) A linear-time computing algorithm for the Hausdorff distance of binary images	25	(184)
	(B) Hajime Ono (Tokyo Metropolitan U.) Hamiltonian stability of Lagrangian tori in toric Kähler manifolds	26	(191)

August 22, (Mon.)

9:00 – 10:00	Nobuhiro Honda (Tokyo Inst. of Tech.) Twistor spaces of self-dual metrics on $n\mathbb{CP}^2$ with circle action	27	(203)
10:15 – 11:15	Yukio Kametani (Keio U.) 10/8-type inequality for spin 4-manifolds with $b_1 > 0$	28	(215)
11:30 – 12:30	Ryoichi Kobayashi (Nagoya U.) The Gauss map of algebraic minimal surfaces and Nevanlinna theory . .	29	(225)
2:00 – 2:45	(A) Shuichi Iida (Univ. of Tokyo) Adiabatic limits of eta-invariants and Meyer functions	30	(274)
	(B) Masao Katou (Tohoku U.) Affine minimal ruled hypersurfaces	31	(277)
	(C) Masahiro Ooguri (Science U. of Tokyo) The classification of 3-dimensional locally homogeneous Blaschke hypersurfaces	32	(284)
3:00 – 3:45	(A) Koki Ito (Kyoto U.) The hypergeometric type integral associated to the configuration space of points on an elliptic curve	33	(290)
	(B) Sanae Kurosu (Tokyo Inst. of Tech.) On some properties for the Ricci tensors of a statistical manifold and affine immersions	34	(305)
	(C) Kazuto Iijima (Nagoya U.) The representation theoretical method about obstructions of local isometric embeddings of Riemannian submanifolds	35	(315)
4:00 – 4:45	(A) Yasushi Homma (Science U. of Tokyo) Estimating the eigenvalues on Quaternionic Kähler Manifolds	36	(322)
	(B) Hitoshi Furuhashi (Hokkaido U.) Affine Immersions and Holomorphic Statistical Structures	37	(332)
5:00 – 5:45	(A) Hideya Hashimoto (Meiji U.) On the Gauss map of 6-dimensional submanifolds of the octonions	38	(341)
	(B) Costin Vîlcu (Romanian Academy/Kumamoto U.) Farthest and critical point mappings on surfaces	39	(349)

August 23, (Tues.)

9:00 – 10:00	Tsuyoshi Kato (Kyoto U.) Macroscopic pattern formation from interacting maps in microscale . . .	40	(355)
10:15 – 11:15	Motoko Kotani (Tohoku U.) Magnetic transition operators on a crystal lattice	41	(362)
11:30 – 12:30	Toshikazu Sunada (Meiji U.) Geometric Theory of Lattice Vibrations — In centennial commemoration of Einstein's great achievements in 1905 —	42	(365)
2:00 – 2:45	(A) Masaki Jomomiji (Tohoku U.) Visualization of the eigenvalue problems of the Laplacian	43	(371)
	(B) Satoshi Minabe (Nagoya U.) On certain aspects of string/gauge theory correspondence	44	(386)
3:00 – 3:45	(A) Junya Takahashi (Tohoku U.) Collapsing of Riemannian manifolds and large eigenvalues of the Laplacian on p -forms	45	(389)
	(B) Yuji Sano (Hokkaido U.) On comparison between balanced metrics and canonical Kähler metrics	46	(403)
4:00 – 4:45	(A) Shigeo Kawai (Saga U.) On the spectrum of the Dirac operator on a noncompact manifold	47	(408)
	(B) Toshihiro Shoda (Kyushu U.) On triply periodic minimal surfaces in Euclidean space	48	(414)

6.7 「部分多様体論・湯沢 2005」記録

部分多様体論・湯沢 2005

■ 日程： 2005 年 11 月 23 日 (水・祝)～25 日 (金)

■ 場所： 新潟県湯沢町・湯沢グランドホテル (合宿形式)

TEL： 025-784-2351 (FAX) 025-784-4520

URL： <http://www.ygh-jp.com/>

■ プログラム

○ 11 月 23 日 (水・祝)

- ・ 14:30—15:30 坊向伸隆氏 (大阪市立大学)
「シンプレクティック等質空間と非コンパクト単純リー群」
- ・ 15:45—16:45 小池直之氏 (東京理科大学)
「複素等焦部分多様体と Hermann 型作用」
- ・ 17:00—18:00 濱田龍義氏 (福岡大学)
「対話式幾何学ソフトウェアについて」
- ・ 20:00—21:00 ショートコミュニケーション
杉山儀 氏 (名古屋工業大学)
野田知宣氏 (大阪市立大学)

○ 11 月 24 日 (水)

- ・ 8:50—9:50 昆万佑子氏 (北海道大学)
「Ricci-recurrent な実超曲面について」
- ・ 10:10—11:10 大仁田義裕氏 (大阪市立大学)
「The deformation and stability of special Lagrangian cones」
- ・ 11:20—12:20 岡安隆氏 (茨城大学)
「スカラー曲率一定な完備超曲面の構成」
- ・ 15:00—16:00 剣持勝衛氏 (東北大学)
「平均曲率一定回転超曲面に関する Hsiang-Yu の定理の別証明」
- ・ 16:30—17:30 國分正敏氏 (東京電機大学)
「3次元双曲型空間のある種の Weingarten 曲面について」
- ・ 20:00—21:00 ショートコミュニケーション
田崎 博之氏 (筑波大学)
小野 肇氏 (首都大学東京)

○ 11 月 25 日 (金)

- ・ 8:50—9:50 酒井高司氏 (首都大学東京)
「Transferred kinematic formulae in two point homogeneous spaces」
- ・ 10:10—11:10 兼田英二氏 (大阪外国語大学)
「Symplectic 群 $Sp(n)$ の正準等長埋め込みの剛性について」
- ・ 11:20—12:20 東條晃次氏 (千葉工業大学)
「アファイン対称空間とコンパクト 3-対称空間の複素構造及び全実全測地的部分多様体」

参加者

井川 治	福島工業高等専門学校
入江 博	東京電機大学
宇田川 誠一	日本大学
榎本 一之	東京理科大学
大仁田 義裕	大阪市立大学
小野 肇	首都大学東京
岡安 隆	茨城大学
金行 壮二	日本工業大学
兼田 英二	大阪外国語大学
剣持 勝衛	東北大学
小池 直之	東京理科大学
國分 雅敏	東京電機大学
昆 万佑子	北海道大学
酒井 高司	首都大学東京
杉山 儀	名古屋工業大学
野田 知宣	大阪市立大学
濱田 龍義	福岡大学
藤岡 敦	一橋大学
古畑 仁	北海道大学
坊向 伸隆	大阪市立大学
田崎 博之	筑波大学
田丸博士	広島大学
田丸千夏	
塚本千秋	京都工芸繊維大学
東條 晃次	千葉工業大学
平川 信也	東北大学
間下 克哉	東京農工大学
守屋 克洋	筑波大学

28 名

部分多様体論・湯沢2005

研究集会記録

2005年11月23日(水)～25日(金)
於 新潟県 湯沢町・湯沢グランドホテル

世話人： 東北大学 劔持勝衛
 東京農工大学 間下克哉
 筑波大学 田崎博之

平成17年度文部省科学研究費補助金 基盤研究(A)
未踏数学の開拓と情報発信の高度化(15204003)
研究代表者： 東北大学・大学院理学研究科・教授 西川 青季

平成17年度 文部省科学研究費補助金 基盤研究(C)
ケイリー代数とグラスマン幾何学(16540055)
研究代表者： 東京農工大学・教授 間下 克哉

序文

研究集会「部分多様体論・湯沢 2005」は、2005 年 11 月 23 日（水）から 25 日（金）までの 3 日間にわたり湯沢グランドホテル（新潟県・湯沢町）において、合宿形式で行われました。剣持勝衛先生により 1996 年 11 月に第 1 回が開かれて以来、同じ時期に同じ場所で同じ規模で継続して行っている研究集会「部分多様体論・湯沢」の第 10 回にあたるものです。

今回も 28 名の参加があり大きな成果をあげることができました。ショートコミュニケーションを含む 15 名の講演者の皆様には周到な準備のもとに興味深い講演をしていただき、さらにこの記録集の原稿の作成もしていただきました。東北大学・西川青季教授には、代表となっている科学研究費から援助をいただきました。また湯沢グランドホテルには快適な会場の設営にご協力いただきました。これらの皆様をはじめとして、有意義な研究会となるようご協力いただいた全ての参加者の皆様に感謝の意を表します。

世話人を代表して

間下 克哉

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6.8 「Differential Geometry, Sendai 2006」記録

研究集会「Differential Geometry, Sendai 2006」

東北大学西川青季氏の科学研究費（基盤A（1）（一般））の補助により、研究集会「Differential Geometry, Sendai 2006」を下記のように開催致します。ご参加頂ければ幸いです。

日時：2006年2月9日（木）

場所：東北大学工学部「青葉記念会館」中研修室（702号室）

プログラム

- 10:00–10:50 Mihai Adela (Universitatea din Bucuresti),
Geometric inequalities for submanifolds in complex
space forms
- 11:00–11:50 Fujioka Atsushi (Hitotsubashi University),
Curves and surfaces related to conformal differential
geometry
- 13:30–14:20 Loubeau Eric (Universite de Brest),
Biharmonic maps
- 14:30–15:20 Katagiri Minyo (Nara Women's University),
Critical Riemannian metrics for a curvature functional
- 15:30–16:20 Nishikawa Seiki (Tohoku University),
Critical metrics of the Schouten functional
on four-manifolds

旅費のサポートができます。希望される方は世話人宛に2006年1月20日（金）までにメールでご連絡ください。

会場へのアクセス：JR仙台駅西口バスプール9番乗り場より市バス、「宮教大」、「宮教大・青葉台」、「宮教大・成田山」、「動物公園循環（青葉通・理・工学部・仙台城跡南経由）」乗車で、「工学部中央」下車徒歩1分。

青葉記念会館については下記 URL をご参照ください.

<http://www.eng.tohoku.ac.jp/php/eng/campusmap/building/map-f-6.php>

世話人

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上野慶介 : ueno@sci.kj.yamagata-u.ac.jp

Workshop
「Differential Geometry, Sendai 2006」

Date : 09 February 2006

Place : Aoba Memorial Hall, Room 702
(School of Engineering, Tohoku University)

Program

- 10:00–10:50 Mihai Adela (Universitatea din Bucuresti),
Geometric inequalities for submanifolds
in complex space forms
- 11:00–11:50 Fujioka Atsushi (Hitotsubashi University),
Curves and surfaces related to conformal
differential geometry
- 13:30–14:20 Loubeau Eric (Universite de Brest),
Biharmonic maps
- 14:30–15:20 Katagiri Minyo (Nara Women's University),
Critical Riemannian metrics for a curvature
functional
- 15:30–16:20 Nishikawa Seiki (Tohoku University),
Critical metrics of the Schouten functional
on four-manifolds

参加者リスト

Fujioka Atsushi	藤岡 敦	一橋大学
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Ichiyama Toshiyuki	一山稔之	亜細亜大学
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Kamada Hiroyuki	鎌田博行	宮城教育大学
Katagiri Minyo	片桐民陽	奈良女子大学
Kato Masao	加藤正夫	東北大学情報
Kikuta Shin	菊田 伸	東北大学理学部
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Matsumoto Koji	松本紘司	山形大学
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Yawata Makoto	八幡 誠	千葉工大

20名

6.9 「部分多様体論・湯沢 2006」記録

部分多様体論・湯沢 2006

■ 日程：2006 年 11 月 29 日(水)～12 月 1 日(金)

■ 場所：新潟県湯沢町・湯沢グランドホテル（合宿形式）
TEL：025-784-2351 (FAX) 025-784-4520
URL：<http://www.ygh-jp.com/>

■ プログラム

○ 11 月 29 日(水)

- ・ 14:30～15:30 木村太郎（東京理科大）
階数 2 のコンパクト対称空間内の全測地的部分多様体について
- ・ 15:45～16:45 梅原雅顕（大阪大）
 R^3 の平坦な波面について
- ・ 17:00～18:00 安藤直也（熊本大）
曲面の曲率線の測地的曲率について
- ・ 20:00～21:00 ショートコミュニケーション
間下克哉（東京農工大）
北川友美子（東京理科大）

○ 11 月 30 日(目)

- ・ 8:40～9:40 坊向伸隆（大阪市大）
アフィン対称空間内の鏡映部分多様体
- ・ 10:00～11:00 大仁田義裕（大阪市大）
可積分系による Willmore 予想へのアプローチ（概説）I
- ・ 11:20～12:20 岡安隆（茨城大）
スカラー曲率 0 な超曲面の構成
- ・ 14:30～15:30 大仁田義裕（大阪市大）
可積分系による Willmore 予想へのアプローチ（概説）II
- ・ 15:45～16:45 守屋克洋（筑波大）
Lagrangian surfaces in terms of quaternions
- ・ 17:00～18:00 野田知宣（大阪市大）
対称性をもつ presymplectic 多様体の幾何
- ・ 20:00～21:00 ショートコミュニケーション
昆万佑子（北海道大）
田中垂矢子（横浜市立大）

○ 11 月 25 日(金)

- ・ 8:40～9:40 入江博（電機大）
ハミルトン微分同相群およびその等質空間上の Hofer 幾何について
- ・ 10:00～11:00 酒井高司（大阪市大）
弱鏡映部分多様体と austere 部分多様体
- ・ 11:20～12:20 ラスマン（神戸大）
 H^3 の平坦な波面について

参加者

安藤 直也	熊本大学
入江 博	東京電機大学
ウェイン ラスマン	神戸大学
梅原 雅顕	大阪大学
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田崎 博之	筑波大学
田中 亜矢子	横浜市立大学
野田 知宣	大阪府立大学
藤岡 敦	一ツ橋大学
坊向 伸隆	大阪府立大学
間下 克哉	東京農工大学
守屋 克洋	筑波大学

23 名

部分多様体論・湯沢2006

研究集会記録

2006 年 11 月 29 日（水）～12 月 1 日（金）
於 新潟県 湯沢町・湯沢グランドホテル

世話人： 東京農工大学 間下克哉
筑波大学 田崎博之

平成 18 年度文部省科学研究費補助金 基盤研究 (A)
未踏数学の開拓と情報発信の高度化 (15204003)
研究代表者： 東北大学・大学院理学研究科・教授 西川 青季

平成 18 年度 文部省科学研究費補助金 基盤研究 (C)
ケイリー代数とグラスマン幾何学 (16540055)
研究代表者： 東京農工大学・教授 間下 克哉

序文

研究集会「部分多様体論・湯沢 2006」は、2006 年 11 月 29 日（水）から 12 月 1 日（金）までの 3 日間にわたり湯沢グランドホテル（新潟県・湯沢町）において、合宿形式で行われました。剣持勝衛先生により 1996 年 11 月に第 1 回が開かれて以来、同じ時期に同じ場所と同じ規模で継続して行っている研究集会「部分多様体論・湯沢」の第 11 回にあたるものです。

今回も 23 名の参加があり大きな成果をあげることができました。ショートコミュニケーションを含む 15 名の講演者の皆様には周到な準備のもとに興味深い講演をしていただき、さらにこの記録集の原稿の作成もしていただきました。東北大学・西川青季教授には、代表となっている科学研究費から援助をいただきました。また湯沢グランドホテルには快適な会場の設営にご協力いただきました。これらの皆様をはじめとして、有意義な研究会となるようご協力いただいた全ての参加者の皆様に感謝の意を表します。

世話人を代表して

間下 克哉

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6.10 「Geometric Analysis, Sendai 2007」記録

WORKSHOP
“Geometric Analysis, Sendai 2007”
January 13 – 15, 2007

Venue : Sendai International Center, Meeting Room 2 (Jan. 13 and 14)
Mathematical Institute, Tohoku University, Room 518 (Jan. 15)

PROGRAM

January 13 (Sat.)

- 9:30–10:00 Registration and Opening
- 10:00–11:00 Seiki Nishikawa (Tohoku University)
Asymptotic expansion of the Chern-Simons integral
– One-loop approximation via stochastic analysis
- 11:15–12:15 Paul Baird (University of Brest)
Three-dimensional Ricci solitons
- 14:00–15:00 Zejun Hu (Zhengzhou University)
Riemannian functionals and their critical metrics
- 15:15–16:15 Thomas Au (Chinese University of Hong Kong)
Comparing corresponding dihedral angles
on classical geometric simplexes
- 16:30–17:30 Huili Liu (Northeastern University)
Curves and hypersurfaces in lightlike cones

January 14 (Sun.)

- 10:00–11:00 Udo Simon (Technical University of Berlin)
Schouten curvature functions on conformally flat manifolds
- 11:15–12:15 Tadashi Aikou (Kagoshima University)
Complex Finsler metrics and Chern-Finsler connection
- 14:00–15:00 Martin Guest (Tokyo Metropolitan University)
Three remarks on singularities of harmonic maps

- 15:15–16:15 Xiaohuan Mo (Peking University)
Harmonic morphisms and Randers metrics
of constant flag curvature
- 16:30–17:30 Hironori Kumura (Shizuoka University)
Radial curvature of ends and spectral structure
of the Laplacian

January 15 (Mon.)

- 10:00–11:00 Ali Fardoun (University of Brest)
Weakly p -harmonic maps to a closed hemisphere
- 11:15–12:15 Rachid Regbaoui (University of Brest)
Nodal sets of solutions to non-local equations
in compact Riemannian manifolds
- 13:30–14:30 Yuguang Shi (Peking University)
Rigidity of compact manifolds and positivity
of quasilocal mass
- 14:45–15:45 Sumio Yamada (Tohoku University)
A finite rank property of Teichmüller spaces

Organizers:

Seiki Nishikawa (Tohoku University)

Keisuke Ueno (Yamagata University)

January 15 (Mon.)

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Rachid Regbaoui (University of Brest) Nodal sets of solutions to non-local equations in compact Riemannian manifolds	23
Yuguang Shi (Peking University) Rigidity of compact manifolds and positivity of quasilocal mass	24
Sumio Yamada (Tohoku University) A finite rank property of Teichmüller spaces	

LIST of PARTICIPANTS
WORKSHOP
“Geometric Analysis, Sendai 2007”
January 13 – 15, 2007

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Geometric Analysis, Sendai 2007

January 13 - 15, 2007

ABSTRACTS

Sendai International Center, Meeting Room 2 (Jan. 13 and 14)
Mathematical Institute, Tohoku University, Room 518 (Jan. 15)
Sendai, Japan

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ADVANCED STUDIES IN PURE MATHEMATICS 35

Chief Editor: Eiichi Bannai (Kyushu University)

Higher Dimensional Birational Geometry

Edited by

Shigefumi Mori (Kyoto University) and
Yoichi Miyaoka (University of Tokyo)

Mathematical Society of Japan

This book was typeset by $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathcal{T}\mathcal{E}\mathcal{X}$ and $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathcal{L}\mathcal{A}\mathcal{T}\mathcal{E}\mathcal{X}$, the $\mathcal{T}\mathcal{E}\mathcal{X}$ macro systems of the American Mathematical Society, together with the style files `aspm.sty` and `aspmfm.sty` for $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathcal{T}\mathcal{E}\mathcal{X}$ written by Dr. Chiaki Tsukamoto and `aspmproc.sty` for $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathcal{L}\mathcal{A}\mathcal{T}\mathcal{E}\mathcal{X}$ written by Dr. Akihiro Munemasa.

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Edited by the Mathematical Society of Japan.

Published by the Mathematical Society of Japan.

Distributed outside Japan by the American Mathematical Society.

ISBN 4-931469-19-1

2000 Mathematics Subject Classification.

Primary 14-06; Secondary 14Dxx, 14Exx, 14Jxx, 14Kxx.

Advanced Studies in Pure Mathematics 35

Chief Editor

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PRINTED IN JAPAN

by Tokyo Shoseki Printing Co., Ltd.

Preface

The present volume consists of four research articles contributed by participants of the international conference *Higher Dimensional Algebraic Varieties*, 1997, at the Research Institute of Mathematical Sciences (RIMS), Kyoto University during June 2–6 and 9–13, 1997.

The conference, held as part of the special year activities of RIMS during the academic year 1996/97 and cosponsored by the Mathematical Society of Japan, represented the high level of the birational geometry at the time. The invited speakers and their talks were:

- Y. Miyaoka (U. Tokyo), On a numerical characterization of \mathbf{P}^n .
- N. Nakayama (RIMS), Projective manifolds whose universal covering spaces are \mathbf{C}^n .
- A. Corti (U. Cambridge), Birationally rigid \mathbf{Q} -Fano hypersurfaces I (Excluding maximal singularities).
- M. Reid (Warwick U.), Birationally rigid \mathbf{Q} -Fano hypersurfaces II (Constructing birational involutions and untwisting).
- J. Kollár (Princeton U.), Polynomials with integral coefficients.
- F. Bogomolov (Courant Inst.), Weak Hironaka theorem.
- Y. Kawamata (U. of Tokyo), Unobstructed deformations and index 1 covers.
- S. Keel (1) (U. Texas, Austin), Eventual freeness in char p , with applications to M_g and to 3-fold MMP.
- L. Ein (U. Illinois at Chicago), Singularities of theta divisors and birational geometry of irregular varieties.
- S. Helmke (RIMS), On global generation of adjoint linear systems.
- K. Matsuki (Purdue U.), Surface log terminal singularities in positive characteristic.
- S. Mukai (RIMS), Degeneration of $\mathbf{P}^n \times \mathbf{P}^n$ with application to del Pezzo fibration.
- V. Alexeev (U. Georgia), Log canonical singularities and complete moduli.
- G. Sankaran (U. Bath), Abelian surfaces in toric 4-folds.
- S. Keel (2) (U. Texas, Austin), Rational curves on open surfaces I.
- J. McKernan (U. C. Santa Barbara), Rational curves on open surfaces II.
- S. Mori (RIMS), On Reid's conjecture on general elephants.
- M. Hanamura (Kyushu U.), Mixed motivic sheaves

In the second week, more informal talks were given:

- A. Corti, Introduction to the Sarkisov program.
- J. Kollar, Real algebraic threefolds.
- S. Keel and J. McKernan, Rational curves on open surfaces.
- V. V. Shokurov (Johns Hopkins U.), Log flips.

We believe that it would have been a great volume if we could have collected the lectures delivered at the conference. However, some of them had already been submitted elsewhere and some were a little too technical to be included in the ASPM series, which is supposed to be of expository nature. By these twofold reasons, the editors decided that this volume should not be the ordinary proceedings of the conference but a selection of independent full expositions on different topics of fundamental importance in algebraic geometry: moduli spaces of abelian surfaces, rational curves on algebraic varieties, 3-dimensional flips and the theory of elliptic fibrations.

The authors made their best to update the articles to fill the time lag between the conference and the publication, and the editors hope that this volume will provide accessible and systematic treatments of several aspects of recent exciting developments in algebraic geometry.

The editors express their gratitude to the contributors who have patiently awaited the belated publication, and apologise to the Editorial Board of the ASPM for the delay of the preparation and the unusual style of this volume.

Shigefumi Mori
Yoichi Miyaoka

*All papers in this volume have been refereed and are in final form.
No version of any of them will be submitted for publication elsewhere.*

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**ADVANCED STUDIES
IN PURE MATHEMATICS 36**

Chief Editor: Eiichi Bannai (Kyushu University)

Algebraic Geometry 2000, Azumino

Edited by

Sampei Usui (Osaka University) (Chief)

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Edited by the Mathematical Society of Japan.

Published for the Mathematical Society of Japan.

Distributed outside Japan by the American Mathematical Society.

ISBN 4-931469-20-5

2000 Mathematics Subject Classification.

11S20, 14A20, 14B05, 14C30, 14C34, 14D05, 14D06, 14D07, 14F20, 14F30, 14F40, 14H15, 14H25, 14H52, 14J15, 14J27, 14J28, 14J29, 14L05, 22E40, 32G20, 32N10, 32S35, 32S50, 57M99.

Advanced Studies in Pure Mathematics 36

Chief Editor

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PRINTED IN JAPAN

by Tokyo Shoseki Printing Co., Ltd.

Preface

五年かけみんなの夢が咲いた本

The symposium “Algebraic Geometry 2000, Azumino” was held at Izumigo Plaza Hotel Azumino in Hotaka (Nagano, Japan) from July 20 until July 30, 2000.

There were 148 participants, including 59 from overseas and a lot of young researchers, who came from 17 countries: Australia, France, Germany, Greece, India, Israel, Italy, Japan, Korea, the Netherlands, Poland, Romania, Russia, Taiwan, Tunisia, the United Kingdom and the United States.

The topic of the symposium was: Interactions of Algebraic Geometry, Hodge Theory and Logarithmic Geometry from the view point of Degenerations. During the period of the symposium, related 38 invited lectures were presented, and there were various kind of stimulating discussions among leading experts and young researchers.

Our goals were, on one side, the interactions among the schools of Algebraic Geometry, of Hodge Theory and of Logarithmic Geometry from the view point of degenerations, and, on the other side, the interactions among leading experts and young researchers. Thanks to the active cooperations of all participants, we are quite confident that both goals were successfully achieved, we even hope that this symposium will continue to have a positive impact on the future relations among various schools of thoughts about the study and the use of degenerations. The meeting was also successful from the view point of its organization. The beautiful location at Izumigo Plaza Hotel Azumino, in the Japan Alps, provided such a stimulating atmosphere.

The present volume is the Proceedings of the symposium, and it contains 12 articles by some of the participants. All papers in this volume were rigorously refereed.

On behalf of the organizers, we wish to express our hearty thanks to all invited speakers for their interesting talks, and to all participants for their stimulating discussions and the warm response to the symposium.

On behalf of the editors, we wish to express our appreciations to the authors for their efforts in preparing their manuscripts. We are deeply grateful to all our referees for their immense efforts and discipline in evaluating the papers.

This symposium was supported by Grants-in-Aid for Scientific Researches, Ministry of Education, Science, Sports and Culture, Japan. We are grateful for their generous financial support.

July, 2002
The Editors:
Sampei Usui (Chief)
Mark Green
Luc Illusie
Kazuya Kato
Eduard Looijenga
Shigeru Mukai
Shuji Saito

*All papers in this volume have been refereed and are in final form.
No version of any of them will be submitted for publication elsewhere.*

Algebraic Geometry 2000, Azumino

Period: July 20–30, 2000

Place: Izumigo Plaza Hotel Azumino, Nagano, Japan

Program:

July 20 (Thursday)

- 09:40 – 10:40 **Phillip Griffiths** (Talk was given by M. Green)
Tangent spaces to the space of Algebraic cycles
- 11:00 – 12:00 **Mark Green**
Periods of Abel-Jacobi maps and spread
- 15:00 – 16:00 **Masanori Asakura**
On the K_1 -groups of algebraic curves
- 16:20 – 17:20 **Morihiro Saito**
On a refined cycle map

July 21 (Friday)

- 09:40 – 10:40 **Kazuya Kato**
Moduli of logarithmic Hodge structures and period maps I
(Generalizations of theories of Mumford, Borel-Serre, Griffiths)
- 11:00 – 12:00 **Sampei Usui**
Moduli of logarithmic Hodge structures and period maps II
(Generalizations of theories of Mumford, Borel-Serre, Griffiths)
- 15:00 – 16:00 **Shuji Saito**
Periods of integral of degenerating hypersurfaces and logarithmic Torelli problem
- 16:20 – 17:20 **Bert van Geemen**
Half-twists of Hodge structures of CM-type
- 17:40 – 18:40 **Steven Zucker**
The reductive Borel-Serre as an algebraic variety

July 22 (Saturday)

- 09:40 – 10:40 **Hélène Esnault**
Riemann-Roch problems for linear differential equations I
- 11:00 – 12:00 **Spencer Bloch**
Riemann-Roch problems for linear differential equations II
- 15:00 – 16:00 **Claire Voisin**
Nori connectivity theorem and regulator maps
- 16:20 – 17:20 **Stefan Müller-Stach**
On K_2 of an algebraic surface
- 17:40 – 18:40 **Joseph Steenbrink**
Remarks about the cohomology of discriminant complements

July 24 (Monday)

- 09:40 – 10:40 **Kazuhiro Konno**
A note on canonical algebras on surfaces
- 11:00 – 12:00 **Nick Shepherd-Barron**
Isomorphism classes in local moduli spaces
- 15:00 – 16:00 **Tadashi Ashikaga**
Remarks on degenerations of curves
- 16:20 – 17:20 **Koji Ohno**
On degenerations of algebraic surfaces with Kodaira dimension zero without semi-stable assumption

July 25 (Tuesday)

- 09:40 – 10:40 **Shigeru Mukai**
Elementary moduli construction without quotient scheme
- 11:00 – 12:00 **Eyal Markman**
Hyperkahler varieties; their reflections and monodromy
- 15:00 – 16:00 **Ken-ichi Yoshikawa**
K3 surfaces with involution, Analytic torsion and Automorphic Forms on the Moduli Space
- 16:20 – 17:20 **Shigeyuki Kondo**
A ball quotient structure for the moduli of curves of genus 3 and 4

July 26 (Wednesday)

- 09:40 – 10:40 **Eduard Looijenga**
A complete moduli space for rational elliptic fibrations
- 11:00 – 12:00 **Masanori Ishida**
Intersection complexes of toric varieties
- 15:00 – 16:00 **Valery Alexeev**
Moduli of stable maps with group action
- 16:20 – 17:20 **Yoshinori Namikawa**
Complex symplectic varieties

July 28 (Friday)

- 09:40 – 10:40 **Arthur Ogus**
The Poincaré lemma and its variations
- 11:00 – 12:00 **Mark Kisin**
Endomorphisms of Logarithmic Schemes
- 15:00 – 16:00 **Wieslawa Niziol**
 K -theory of log schemes
- 16:20 – 17:20 **Chikara Nakayama**
Ket sites, roundings and $\log C^\infty$ -functions

July 29 (Saturday)

- 09:40 – 10:40 **Luc Illusie**
On the local variation
- 11:00 – 12:00 **Takeshi Saito**
Conductor formula of Bloch
- 15:00 – 16:00 **Ofer Gabber**
Independence of l for intersection cohomology
- 16:20 – 17:20 **Kazuhiro Fujiwara**
Integral cohomology of unitary Shimura varieties

July 30 (Sunday)

- 09:40 – 10:40 **Shinichi Mochizuki**
The Hodge-Arakelov Theory of Elliptic Curves
- 11:00 – 12:00 **Christophe Breuil**
 p -torsion Hodge theory: A survey
- 15:00 – 16:00 **Takeshi Tsuji**
Almost étale extensions and p -adic vanishing cycles
- 16:20 – 17:20 **Michel Raynaud**
The fundamental group of complete curves in characteristic p

Acknowledgement. On behalf of the organizers, we wish to express our hearty gratitude to the following people for their many supports without which this symposium could not be performed so smoothly: Masanori Asakura, Tadashi Ashikaga, Kenichi Bannai, Spencer Bloch, Kazuhiro Fujiwara, Takako Fukaya, Kei Hagihara, Tetsuo Hasegawa, Atsushi Ikeda, Teruhiko Inaoka, Tetsushi Ito, Noriko Kawashima, Masanori Kobayashi, Satoshi Kondo, Shigeyuki Kondo, Kazuhiro Konno, Toshiharu Matsubara, Satoshi Mochizuki, Masayoshi Nagata, Tadashi Ochiai, Tadao Oda, Akira Ohbuchi, Koji Ohno, Noriyuki Ohtsubo, Kayo Ohtsuka, Kusuhiro Ono, Michel Raynaud, Hiroshi Saito, Takeshi Saito, Kei Sasao, Ikuo Satake, Kanetomo Sato, Jun Shiho, Yuji Shimizu, Tohkyu Sugioka, Ohmi Sugiyama, Takeshi Usa, Chieko Usui, Noriaki Usui, Kaoru Yamano, Daisuke Yanase, Seidai Yasuda, Hatsue Yoshida, Teruyoshi Yoshida

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7.3 Advanced Studies in Pure Mathematics, Vol. 37 表紙, 序文, 目次

**ADVANCED STUDIES
IN PURE MATHEMATICS 37**

Chief Editor: Eiichi Bannai (Kyushu University)

**Lie Groups, Geometric Structures and
Differential Equations
— One Hundred Years after Sophus
Lie —**

Edited by

Tohru Morimoto (Nara Women's University)

Hajime Sato (Nagoya University) and

Keizo Yamaguchi (Hokkaido University)

Mathematical Society of Japan

This book was typeset by $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathrm{T}\mathrm{E}\mathrm{X}$ and $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathrm{L}\mathrm{A}\mathrm{T}\mathrm{E}\mathrm{X}$, the $\mathrm{T}\mathrm{E}\mathrm{X}$ macro systems of the American Mathematical Society, together with the style files `aspm.sty` and `aspmfm.sty` for $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathrm{T}\mathrm{E}\mathrm{X}$ written by Dr. Chiaki Tsukamoto and `aspmproc.sty` for $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathrm{L}\mathrm{A}\mathrm{T}\mathrm{E}\mathrm{X}$ written by Dr. Akihiro Munemasa.

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Edited by the Mathematical Society of Japan.

Published by the Mathematical Society of Japan.

Distributed outside Japan by the American Mathematical Society.

ISBN 4-931469-21-3

2000 Mathematics Subject Classification.

Primary 58-XX; Secondary 22-XX, 32-XX, 35-XX, 53-XX.

Advanced Studies in Pure Mathematics 37

Chief Editor

Eiichi Bannai (Kyushu University)

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PRINTED IN JAPAN

by Tokyo Shoseki Printing Co., Ltd.

Preface

The present issue of *Advanced Studies in Pure Mathematics* is an outgrowth of the international conference entitled “Lie Groups, Geometric Structures, and Differential Equations - One Hundred Years after Sophus Lie - ”, which took place, on the occasion of the centennial after the death of Sophus Lie (1842 - 1899), in Kyoto and Nara in December 1999. A rapid version of the proceedings has already appeared as one volume in *Lecture Note Series of RIMS Kyoto University* (RIMS Kokyuroku 1150, April 2000).

The influence of Sophus Lie on our mathematics today is so immense and so deep that it is almost out of our scope to overview all the aspects developed after Lie. But we wished that the conference would give us an opportunity to contemplate and discuss what Lie pursued, what developments had been achieved after Lie and what would be important for the coming new century, with the emphasis on the links between Lie groups, geometry and differential equations.

In this volume seventeen papers are presented, which reflect the contents, atmosphere and outgrowth of the above conference. Most of the papers are research papers of usual style, whose topics are rather diversified, but in a broader sense related to the developments of Lie’s ideas. Subjects treated in this volume include Lie groups, geometry of differential equations, contact transformations, Bäcklund transformations, differential algebras, Cartan geometry, CR-geometry and some topics in differential geometry as well as topics in Mathematical Physics. Each contributed paper standing independently by itself, we will not give here comments on each paper, but mention briefly two survey papers specially prepared for this volume.

The paper, by Morimoto, develops a synthetic study of Lie groups, geometric structures and differential equations from a unified view point of nilpotent geometry, by studying objects on filtered manifolds through their first order approximations, nilpotent graded Lie algebras. Generalization from the abelian to the nilpotent proves to be algebraically natural, geometrically useful, and analytically revealing new phenomena. This survey will give an overview on links between groups, geometric structures and differential equations by trying to make clear the underlying structures common to them three.

The paper, by Yamaguchi and Yatsui, discusses the geometry of higher order differential equations of finite type. Starting from a reductive graded Lie algebra of the first kind and its faithful irreducible

representation, they specify a nice class of differential equations of finite type to which one can associate Cartan connections. Invariants of these Cartan connections being found in the generalized Spencer cohomology groups, they carry out detailed calculus of these cohomology groups. Thus there will be presented concrete models in which Lie groups, geometric structures and differential equations are beautifully woven.

The year when Lie passed away was also marked as the opening of a new epoch 1900 - 1910 in which Élie Cartan achieved his deep works on Pfaffian systems, infinite continuous groups, and differential equations, to make a great progress on what Lie had pursued. The underlying philosophy of the two surveys may be said to stem from this period.

We would like to express our sincere gratitude to all those who have helped us to organize the above-mentioned conference and to prepare and publish this volume.

“Don’t follow in the wake of a sage of old,
but try to embark on the quest he pursued.”
(Matsuo Basho, Translated by Shigeharu Ando)

Tohru Morimoto, Hajime Sato, Keizo Yamaguchi

Editors

*All papers in this volume have been refereed and are in final form.
No version of any of them will be submitted for publication elsewhere.*

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7.4 Advanced Studies in Pure Mathematics, Vol. 38 表紙, 序文, 目次

ADVANCED STUDIES
IN PURE MATHEMATICS 38

Chief Editor: Eiichi Bannai (Kyushu University)

Operator Algebras and Applications

Edited by

Hideki Kosaki (Kyushu University)

Mathematical Society of Japan

This book was typeset by $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathcal{T}\mathcal{E}\mathcal{X}$ and $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathcal{L}\mathcal{A}\mathcal{T}\mathcal{E}\mathcal{X}$, the $\mathcal{T}\mathcal{E}\mathcal{X}$ macro systems of the American Mathematical Society, together with the style files `aspm.sty` and `aspmfm.sty` for $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathcal{T}\mathcal{E}\mathcal{X}$ written by Dr. Chiaki Tsukamoto and `aspmproc.sty` for $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathcal{L}\mathcal{A}\mathcal{T}\mathcal{E}\mathcal{X}$ written by Dr. Akihiro Munemasa.

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Edited by the Mathematical Society of Japan.

Published by the Mathematical Society of Japan.

Distributed in North America by the American Mathematical Society.

ISBN 4-931469-23-X

2000 Mathematics Subject Classification.

Primary 46L.

Secondary 11R, 15A, 19A, 19K, 22B, 37A, 37B, 46C, 47A, 55R, 60J, 81B, 81P, 81Q, 81R, 81S, 81T.

Advanced Studies in Pure Mathematics 38

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PRINTED IN JAPAN

by Tokyo Shoseki Printing Co., Ltd.

Preface

There were several US-Japan Seminars on operator algebras in the past, many of which were held at important turning points in the development of the theory of operator algebras such as A. Connes' breakthrough on classification of injective factors, the advent of the Jones index theory and so on. The previous one was held at Philadelphia in 1988, and no seminar was held in the next ten years. However, during this period we witnessed far-reaching advancement of the classification theory on C^* -algebras based on the K-theory, and operator algebraists in the both sides of the Pacific felt to have to have another one with the main emphasis on this subject. Under these circumstances, with the generous financial support from the US National Science Foundation and the Japan Society for Promotion of Science, the US-Japan Seminar "Operator Algebras and Applications" was held on June 7-11, 1999 at the Kyushu University. It is my great pleasure to present here the proceedings of the seminar. At first I am grateful to Professor Bruce Blackadar for his leadership in the US side, which made it possible to plan such a seminar. I am also grateful to all the contributors for their willingness to give me original manuscripts for the current proceedings. Another thing worth recording here is the participation of Korean operator algebraists, which became possible by the mutual agreement between the Korea Science and Engineering Foundation and the above funding organizations. I am grateful to Professor Seung-Hyeok Kye for his effort to make this do happen, and am glad that three articles by Korean authors are included in the proceedings.

Fukuoka, June 2003

Hideki Kosaki

*All papers in this volume have been refereed and are in final form.
No version of any of them will be submitted for publication elsewhere.*

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**ADVANCED STUDIES
IN PURE MATHEMATICS 39**

Chief Editor: Eiichi Bannai (Kyushu University)

**Stochastic Analysis on
Large Scale Interacting Systems**

Edited by

Tadahisa Funaki (University of Tokyo)

Hirofumi Osada (Nagoya University)

Mathematical Society of Japan

This book was typeset by $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathcal{T}\mathcal{E}\mathcal{X}$ and $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathcal{L}\mathcal{A}\mathcal{T}\mathcal{E}\mathcal{X}$, the $\mathcal{T}\mathcal{E}\mathcal{X}$ macro systems of the American Mathematical Society, together with the style files `aspm.sty` and `aspmfm.sty` for $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathcal{T}\mathcal{E}\mathcal{X}$ written by Dr. Chiaki Tsukamoto and `aspmproc.sty` for $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathcal{L}\mathcal{A}\mathcal{T}\mathcal{E}\mathcal{X}$ written by Dr. Akihiro Munemasa.

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Edited by the Mathematical Society of Japan.

Published by the Mathematical Society of Japan.

Distributed in North America by the American Mathematical Society.

ISBN 4-931469-24-8

2000 Mathematics Subject Classification.

Primary 60-06.

Secondary 82-06.

Advanced Studies in Pure Mathematics 39

Chief Editor

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PRINTED IN JAPAN

by Tokyo Shoseki Printing Co., Ltd.

Preface

Large scale interacting systems are various kinds of dynamic models, which usually involve random structures in their evolutionary law, and arise in connection with statistical physics or quantum mechanics and also in other broad area of sciences. They are important objects of study in probability theory. This volume is a collection of fifteen research and survey papers concerning these subjects written by speakers of the two international conferences:

1. The Eleventh Mathematical Society of Japan International Research Institute (MSJ-IRI) "Stochastic Analysis on Large Scale Interacting Systems" which was held at the Shonan Village Center, Hayama, Kanagawa Prefecture, Japan from July 17th to 26th, 2002, and
2. "Stochastic Analysis and Statistical Mechanics" which was held at the Yukawa Institute for Theoretical Physics, Kyoto University on July 29th and 30th, 2002 in the framework of the Special Year for Probability Theory: 2002 International Project Research "Stochastic Analysis and Related Topics" run by Research Institute for Mathematical Sciences (RIMS), Kyoto University.

The MSJ-IRI meeting was divided into two parts, workshop and conference. The first part, July 17th-19th, was called workshop and consisted of four expository lecture series delivered by E. Bolthausen of Universität Zürich, S. Kotani of Osaka University, G. Papanicolaou of Stanford University, and S.R.S. Varadhan of New York University. The second part of the meeting, July 22nd-26th, was called conference and consisted of twenty one-hour invited research lectures and thirteen short contributed talks. The meeting in Kyoto was organized consecutively after the MSJ-IRI meeting and consisted of nine one-hour invited lectures. The chairmen of the organizing committees for these two conferences were T. Funaki of the University of Tokyo and H. Osada of Nagoya University, respectively, and serve as editors of the present volume.

The topics which are discussed in this volume cover the hydrodynamic limit, fluctuations, large deviations, spectral gap (Poincaré inequality), logarithmic Sobolev inequality, Ornstein-Zernike asymptotics, random environments, determinantal expressions for systems including exclusion processes (stochastic lattice gas, Kawasaki dynamics), zero range processes, interacting Brownian particles, random walks, self-avoiding walks, Ginzburg-Landau model, interface models, Ising model,

Widom-Rowlinson model, directed polymers, random matrices, Dyson's model and others.

The conferences were supported by the Mathematical Society of Japan, the Japan Association for Mathematical Sciences, the Japan Society for the Promotion of Science, and RIMS, Kyoto University. We are grateful to their generous financial supports.

We thank all the speakers and the participants for their invaluable contributions which made the conferences most successful. We also thank all the referees for their help to this volume by carrying out painful but excellent jobs.

June, 2003

Tadahisa Funaki
Hirofumi Osada

*All papers in this volume have been refereed and are in final form.
No version of any of them will be submitted for publication elsewhere.*

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7.6 Advanced Studies in Pure Mathematics, Vol. 40 表紙, 序文, 目次

**ADVANCED STUDIES
IN PURE MATHEMATICS 40**

Chief Editor: Eiichi Bannai (Kyushu University)

**Representation Theory of Algebraic
Groups and Quantum Groups**

Edited by

Toshiaki Shoji (Nagoya University)

Masaki Kashiwara (RIMS, Kyoto University)

Noriaki Kawanaka (Osaka University)

George Lusztig (MIT)

Ken-ichi Shinoda (Sophia University)

Mathematical Society of Japan

This book was typeset by $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathrm{T}\mathrm{E}\mathrm{X}$ and $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathrm{L}\mathrm{A}\mathrm{T}\mathrm{E}\mathrm{X}$, the $\mathrm{T}\mathrm{E}\mathrm{X}$ macro systems of the American Mathematical Society, together with the style files `aspm.sty` and `aspmfm.sty` for $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathrm{T}\mathrm{E}\mathrm{X}$ written by Dr. Chiaki Tsukamoto and `aspmproc.sty` for $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathrm{L}\mathrm{A}\mathrm{T}\mathrm{E}\mathrm{X}$ written by Dr. Akihiro Munemasa.

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Edited by the Mathematical Society of Japan.

Published by the Mathematical Society of Japan.

Distributed in North America by the American Mathematical Society.

ISBN 4-931469-25-6

2000 Mathematics Subject Classification.

Primary 17B, 20C, 20G.

Secondary 14F, 14L, 16W, 22E.

Advanced Studies in Pure Mathematics 40

Chief Editor

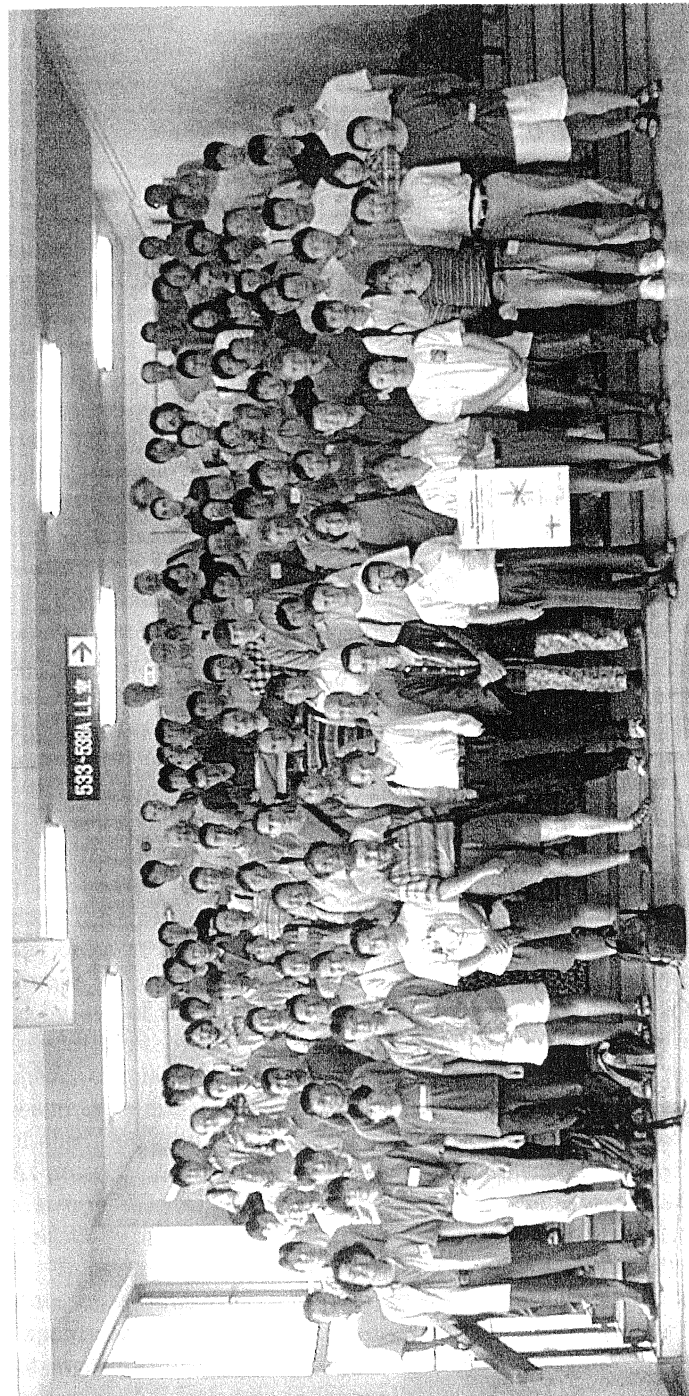
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PRINTED IN JAPAN

by Tokyo Shoseki Printing Co., Ltd.



Preface

The conference “Representation Theory of Algebraic Groups and Quantum Groups” was held at Sophia University in Tokyo from August 1 to 10, 2001, as the 10th International Research Institute of the Mathematical Society of Japan (MSJ-IRI).

During the conference, there were 29 lectures by invited speakers, including a series of survey lectures by Seok-Jin Kang, Hiraku Nakajima, George Lusztig, Olivier Mathieu and Jens Carsten Jantzen. There were 173 participants including 59 from overseas. A lot of young researchers from 14 countries attended the conference, from Australia, Canada, Chile, China, Denmark, France, Germany, Japan, Korea, the Netherlands, Switzerland, Russia, the United Kingdom and the United States.

The conference was planned to focus on recent developments in the representation theory of algebraic groups and quantum groups. The topics covered modular representations of algebraic groups, representations of quantum groups and crystal bases, representations of affine Lie algebras, representations of affine Hecke algebras, modular or ordinary representations of finite Chevalley groups, representations of complex reflection groups and associated Hecke algebras.

There had been an international conference in 1983 at Kyoto on “Algebraic groups and related topics”. It was twenty years ago, and some of our invited speakers also participated in the Kyoto’s conference. Since then, the discovery of quantum groups by Drinfel’d and Jimbo in 1980’s has brought a drastic change to the representation theory of algebraic groups. The representation theory of quantum groups grew up quickly to be one of the main themes in the representation theory of Lie type. In addition to its own interest, it became noticed that the representation theory of quantum groups produces a striking bridge connecting various seemingly unrelated subjects, such as the modular representation theory of algebraic groups and the representation theory of affine Lie algebras. At present, the interactions between those theories are getting tight, and active researches are being done involving the representation theory of Hecke algebras, from geometric and combinatorial point of view.

In organizing the conference, we intended to summarize the present state of various representation theories through the talks by leading experts, and to give a chance for young researchers to be in touch with latest results by those experts. We believe that our aim was achieved well, and the conference became really exciting.

The present volume is the Proceedings of the conference. It contains 17 articles (plus one appendix) contributed by the invited speakers of the conference. Some of them are expository papers, which will give nice perspectives on those subjects for readers.

The study of algebraic groups in Japan was initiated by Professor Nagayoshi Iwahori. The Iwahori-Hecke algebra introduced by him turned out to be a fundamental tool, not only in the representation theory of algebraic groups, but also in wider areas such as knot theory and mathematical physics. He made a remarkable influence on the growth of the representation theory in Japan, and a lot of researchers in Japan nowadays benefited much from him. It is our pleasure to thank Professor Iwahori for such a big contribution to this area.

We express our hearty thanks to all the invited speakers for their interesting and stimulating talks, and to all the participants for their interests to the conference.

We would like to thank the Mathematical Society of Japan for their financial support for the conference. The conference was also supported by the Japan Association for Mathematical Sciences, and by the Grant-in-Aid for Scientific Research by Japan Society for the Promotion of Science. We thank them for their financial supports.

September 2003

Editorial Committee
Toshiaki Shoji
Masaki Kashiwara
Noriaki Kawanaka
George Lusztig
Ken-ichi Shinoda

*All papers in this volume have been refereed and are in final form.
No version of any of them will be submitted for publication elsewhere.*

Mathematical Society of Japan - 10th International Research Institute

Representation Theory of Algebraic Groups and Quantum Groups

DATE: August 1 – 10, 2001

PLACE: Sophia University, Tokyo, Japan

PROGRAM

August 1 (Wednesday)

- 13:45 – 14:45 **T. Tanisaki**
Highest weight modules over affine Lie algebras
- 15:00 – 16:00 **K. Saito**
Elliptic Lie groups
- 16:30 – 17:30 **S. -J. Kang**
Quantum groups and crystal bases

August 2 (Thursday)

- 10:00 – 11:00 **S. -J. Kang**
Perfect crystals and Young walls
- 11:15 - 12:15 **A. Zelevinsky**
An introduction to cluster algebras
- 13:45 - 14:45 **M. Broué**
Families of characters of cyclotomic Hecke algebras
- 15:00 - 16:00 **N. Xi**
A property of distinguished involutions in an affine Weyl group of type \tilde{A}_n
- 16:30 - 17:30 **S. Ariki**
The representation type of Hecke algebras of type B

August 3 (Friday)

- 10:00 - 11:00 **S. -J. Kang**
Fock space representation of quantum affine algebras
- 11:15 - 12:15 **H. Nakajima**
Quiver varieties and quantum affine algebras, I
- 13:45 - 14:45 **M. Kashiwara**
On semisimple holonomic module conjecture

- 15:00 - 16:00 **A. Kleshchev**
Projective representations of symmetric groups via Kac-Moody algebras
- 16:30 - 17:30 **S. Naito**
Twining character formula for Demazure modules

August 4 (Saturday)

- 10:00 - 11:00 **H. Nakajima**
Quiver varieties and quantum affine algebras, II
- 11:15 - 12:15 **G. Lusztig**
Representations of graded Hecke algebras, I

August 6 (Monday)

- 10:00 - 11:00 **G. Lusztig**
Representations of graded Hecke algebras, II
- 11:15 - 12:15 **H. Nakajima**
Quiver varieties and quantum affine algebras, III
- 13:45 - 14:45 **E. Vasserot**
D-modules, formal loop spaces and chiral algebras
- 15:00 - 16:00 **V. Ostrik**
Asymptotic Hecke algebra and central sheaves
- 16:30 - 17:30 **A. Gyoja**
Prehomogeneous vector spaces and representations

August 7 (Tuesday)

- 10:00 - 11:00 **O. Mathieu**
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Representations of graded Hecke algebras, III
- 13:45 - 14:45 **H.H. Andersen**
Small cells and fusion rules
- 15:00 - 16:00 **S. Arkhipov**
Algebraic construction of quasi-Verma modules in positive characteristic
- 16:30 - 17:30 **M. Kaneda**
On the Beilinson-Bernstein correspondence on the flag variety in positive characteristic

August 8 (Wednesday)

- 10:00 - 11:00 **J.C. Jantzen**
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- 11:15 - 12:15 **O. Mathieu**
Connections on stable bundles, II
- 13:45 - 14:45 **A. Kirillov**
Birational representations of symmetric groups, combinatorics and discrete integrable equations
- 15:00 - 16:00 **A. Mathas**
Tilting modules for cyclotomic Schur algebras
- 16:30 - 17:30 **T.A. Springer**
Intersection cohomology of large Schubert varieties

August 9 (Thursday)

- 10:00 - 11:00 **O. Mathieu**
Connections on stable bundles, III
- 11:15 - 12:15 **J.C. Jantzen**
Representations of Lie algebras in prime characteristics, II
- 13:45 - 14:45 **R. Bezrukavnikov**
Localization type Theorems for modular representations and representations of quantum groups at a root of unity
- 15:00 - 16:00 **M. Noumi**
Birational Weyl group actions, discrete integrable systems and tropical combinatorics
- 16:30 - 17:30 **C.W. Curtis**
On the Gelfand-Graev representations of finite reductive groups: Zeta functions and functional equations

August 10 (Friday)

- 10:00 - 11:00 **J.C. Jantzen**
Representations of Lie algebras in prime characteristics, III
- 11:15 - 12:15 **G.I. Lehrer**
Cell modules and standard modules for the affine Hecke algebra of type A
- 13:45 - 14:45 **N. Kawanaka**
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- 15:00 - 16:00 **T. Shoji**
Green functions associated to complex reflection groups

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**ADVANCED STUDIES
IN PURE MATHEMATICS 41**

Chief Editor: Eiichi Bannai (Kyushu University)

**Stochastic Analysis and Related Topics
in Kyoto**

In honour of Kiyosi Itô

Edited by

Hiroshi Kunita (Nanzan University, Editor in chief)

Shinzo Watanabe (Ritsumeikan University)

Yoichiro Takahashi (RIMS, Kyoto University)

Mathematical Society of Japan

This book was typeset by $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathcal{T}\mathcal{E}\mathcal{X}$ and $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathcal{L}\mathcal{A}\mathcal{T}\mathcal{E}\mathcal{X}$, the $\mathcal{T}\mathcal{E}\mathcal{X}$ macro systems of the American Mathematical Society, together with the style files `aspm.sty` and `aspmfm.sty` for $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathcal{T}\mathcal{E}\mathcal{X}$ written by Dr. Chiaki Tsukamoto and `aspmproc.sty` for $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathcal{L}\mathcal{A}\mathcal{T}\mathcal{E}\mathcal{X}$ written by Dr. Akihiro Munemasa.

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Edited by the Mathematical Society of Japan.

Published by the Mathematical Society of Japan.

Distributed in North America by the American Mathematical Society.

ISBN 4-931469-26-4

2000 Mathematics Subject Classification.

Primary 60H.

Secondary 22E, 31C, 35P, 37K, 46E, 46G, 47D, 49M, 58E, 58J, 60G, 60J, 82B, 82C, 91B, 93C.

Advanced Studies in Pure Mathematics 41

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PRINTED IN JAPAN

by Tokyo Shoseki Printing Co., Ltd.

Preface

This book is based on lectures given at the conference “Stochastic analysis and the related topics” held at RIMS, Kyoto University in Sept. 4-7, 2002, which is the biggest meeting of RIMS International Project (Research), 2002. The conference consisted of three sessions on Stochastic analysis and a special session celebrating of Professor Kiyosi Itô on the occasion of *Beiju*. It means 88th birthday in Japanese. Actually on Sept. 7th, 2002, Kiyosi Itô celebrated his 88th birthday counting ages in the traditional way or his 87th birthday counting in the western way.

Kiyosi Itô was a professor of Kyoto University during 1952-1979. There he brought up a number of students. In the meantime he often visited United States and European countries, where he encountered some friends, colleagues and students. In the ceremonial session, the organizing committee invited, both from foreign countries and from Japan, 11 mathematicians who had a close relationship with Kiyosi Itô for a long time. We regret that we missed many friends of him, whom he might have wished to meet in Kyoto.

Topics of sessions on Stochastic analysis that we selected were Mathematical finance, Markov processes and Malliavin calculus. These sessions are by no means independent of the ceremonial session. Itô's stochastic calculus initiated in 1942 by himself alone is now recognized widely as a most fundamental theory in Stochastic analysis. We cannot talk about Mathematical finance without Itô's formula. Itô's stochastic differential equation is a key object in the theory of Markov process and Malliavin calculus. We invited another 11 mathematicians who are working now actively in these fields of stochastic analysis.

Members of the organizing committee of the conference were Masatoshi Fukushima, Shigeo Kosuoka, Hideo Nagai, Ichiro Shigekawa and ourselves. Takashi Kumagai worked for the preparation of the conference as a secretary. We thank them all. It is ultimately Professor Itô himself whom we wish to thank; our great teacher. *Arigatô gozaimasu.*

Shinzo Watanabe
Hiroshi Kunita
Yoichiro Takahashi

Kyoto, September 2003

*All papers in this volume have been refereed and are in final form.
No version of any of them will be submitted for publication elsewhere.*

A note of thanks by K. Itô

I would like to express my deepest appreciation to the organizers of this international symposium on stochastic analysis. I feel most honored that the special session was dedicated to celebrating my 88th Beiju birthday.

When I started my study of mathematics at Tokyo University, the most popular field of mathematics in Japan was number theory, but I myself was not successful at it. One day, I saw Kolmogorov's book on measure theoretical probability theory at the Maruzen bookstore in Tokyo. If I recall correctly, my university classmates, K. Kodaira and Y. Kawada, were also there with me in the bookstore. As I was only a first-year student, it was much too difficult for me to understand, but sooner or later I came to enjoy this rigorous description. Later I read Paul Lévy's book on infinite divisible probability distribution and stochastic processes, which seemed to me more profound and more attractive even though less rigorous. My Ph.D. thesis in 1942 was devoted to making Paul Lévy's theory as rigorous as Kolmogorov's theory. Afterwards, my interests were naturally directed to the theory of Markov processes and diffusion processes, of which an analytic theory had been formulated by Kolmogorov. Pursuing the study of the sample paths of processes in the same way as additive processes, I finally succeeded in introducing stochastic differential equations. Next, I tried to describe paths of one-dimensional Feller's diffusions. I owe the success of my project to Henry McKean, without whose collaboration this research would not have been possible.

I was born on September 7th, 1915, so I am eighty-seven years old today. But counting the day that I was born as my first birthday, today is my eighty-eighth birthday (Beiju), and it will undoubtedly be one of the most extraordinary and memorable birthdays in my lifetime. I had never thought that I would live so long, and my only regret is that my wife, my constant companion of sixty-two years, whom many of you know as Mrs. Itô, is no longer here to share this happy moment with me.

During this symposium, I learned of many new and exciting recent developments in stochastic analysis, and I feel encouraged to also pursue probability theory for another ten years. Let me again express my most sincere thanks to the symposium organizers and to all the participants for this special session and party celebrating my eighty-eighth birthday. Thank you very much.

Kiyosi Itô
September 7th, 2002

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**ADVANCED STUDIES
IN PURE MATHEMATICS 42**

Chief Editor: Eiichi Bannai (Kyushu University)

**Complex Analysis
in Several Variables
— Memorial Conference of
Kiyoshi Oka's Centennial Birthday
Kyoto/Nara 2001**

Edited by

Kimio Miyajima (Kagoshima University)
Mikio Furushima (Kumamoto University)
Hideaki Kazama (Kyushu University)
Akio Kodama (Kanazawa University)
Junjiro Noguchi (The University of Tokyo)
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Tetsuo Ueda (Kyoto University)

Mathematical Society of Japan

This book was typeset by $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathrm{T}\mathrm{E}\mathrm{X}$ and $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathrm{L}\mathrm{A}\mathrm{T}\mathrm{E}\mathrm{X}$, the $\mathrm{T}\mathrm{E}\mathrm{X}$ macro systems of the American Mathematical Society, together with the style files `aspm.sty` and `aspmfm.sty` for $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathrm{T}\mathrm{E}\mathrm{X}$ written by Dr. Chiaki Tsukamoto and `aspmproc.sty` for $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathrm{L}\mathrm{A}\mathrm{T}\mathrm{E}\mathrm{X}$ written by Dr. Akihiro Munemasa.

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Edited by the Mathematical Society of Japan.

Published by the Mathematical Society of Japan.

Distributed in North America by the American Mathematical Society.

ISBN 4-931469-27-2

2000 Mathematics Subject Classification.

Primary 00B20.

Secondary 32Axx, 32Exx, 32Fxx, 32Hxx, 32Qxx, 32Sxx, 32Vxx, 32Wxx, 37Fxx, 14Cxx, 14Jxx, 14Rxx, 58Jxx.

Advanced Studies in Pure Mathematics 42

Chief Editor

Eiichi Bannai (Kyushu University)

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PRINTED IN JAPAN

by Tokyo Shoseki Printing Co., Ltd.

Preface

The present conference was held to commemorate the centennial birthday of late Professor Kiyoshi Oka in the fall of 2001 from October 30th through November 5th at Kyoto and from November 6th through 8th at Nara. This volume contains the records and the contributed articles based on the talks delivered at the conference, and is dedicated to the memory of Kiyoshi Oka.

It is our great pleasure to include a letter of Professor Henri Cartan written for this conference. As we planned to ask Professor H. Cartan to write some words for this memorial conference and had a contact with him, we learned that he had written such a letter already, being asked by Professor Jean Pierre Serre. Soon later we were informed that it was organized so by Professor Reinhold Remmert. Unfortunately, Professor R. Remmert was unable to come to the conference because of his health condition, but the letter was presented and read by Masakazu Suzuki at the opening. We sincerely express our deepest gratitude to Professor R. Remmert for his kind arrangement.

Since there is included a survey article by Toshio Nishino on K. Oka, we limit here ourselves only to make a brief comment how the conference was organized. The idea to hold such a conference for K. Oka came up about four years ago in a small number of Japanese colleagues working in complex analysis in several variables. Then in the spring of 2000, it swiftly grew up among broader people. The initial organizing committee was formed in summer, 2000, and then it had been enlarged to the present one. We sincerely appreciate the kindness of the family of late Professor K. Oka who accepted the idea of the present conference with pleasure.

Speakers were invited not only from those in complex analysis in several variables, but also from those in neighboring areas to which the work of K. Oka has given influences.

In 1999 the remaining manuscripts and memoranda of K. Oka were donated to Nara Women's University Library by his family. Nara Women's University Library run a special exhibition of the Oka Collection including those manuscripts and memoranda for the national holiday of culture, November 3rd., actually, 1st to 8th at the Memorial Auditorium of Important Cultural Property. The dates of this memorial conference had been selected, so that it was coherent to the special exhibition.

The first part of the conference at Kyoto was held as a special program of Research Institute of Mathematical Sciences, Kyoto University, and the second part at Nara was held under the joint sponsorship of

Nara Women's University Library, to both of which our deep thanks are due. The conference was made possible by the financial supports of scientific research funds of the ministry, Monbukagakusho, Grant-in-Aid for Scientific Research (A)(1) 12304007 represented by H. Fujimoto, Grant-in-Aid for Scientific Research (B)(1) 12440035 represented by T. Ohsawa, and Grant-in-Aid for Scientific Research (A)(1) 13304009 represented by J. Noguchi, to which we are very grateful.

J. Noguchi
August 2003

*All papers in this volume have been refereed and are in final form.
No version of any of them will be submitted for publication elsewhere.*

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**ADVANCED STUDIES
IN PURE MATHEMATICS 43**

Chief Editor: Toshitake Kohno (The University of Tokyo)

**Singularity Theory and
Its Applications**

Edited by

Shyuichi Izumiya (Hokkaido University)

Goo Ishikawa (Hokkaido University)

Hiroo Tokunaga (Tokyo Metropolitan University)

Ichiro Shimada (Hokkaido University)

Takasi Sano (Hokkaigakuen University)

Mathematical Society of Japan

This book was typeset by $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathcal{T}\mathcal{E}\mathcal{X}$ and $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathcal{L}\mathcal{A}\mathcal{T}\mathcal{E}\mathcal{X}$, the $\mathcal{T}\mathcal{E}\mathcal{X}$ macro systems of the American Mathematical Society, together with the style files `aspm.sty` and `aspmfm.sty` for $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathcal{T}\mathcal{E}\mathcal{X}$ written by Dr. Chiaki Tsukamoto and `aspmproc.sty` for $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathcal{L}\mathcal{A}\mathcal{T}\mathcal{E}\mathcal{X}$ written by Dr. Akihiro Munemasa.

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Edited by the Mathematical Society of Japan.

Published by the Mathematical Society of Japan.

Distributed by the Mathematical Society of Japan, the American Mathematical Society and the World Scientific Publishing Co. Ltd.

Distributed exclusively in North America by the American Mathematical Society.

Partially supported by Grant-in-Aid for Publication of Scientific Research Results, Japan Society for the Promotion of Science.

ISBN 978-4-931469-32-7

2000 Mathematics Subject Classification.

Primary 58K99.

Secondary 32S99.

Advanced Studies in Pure Mathematics 43

Chief Editor

Toshitake Kohno (Univ. of Tokyo)

Editorial Board of the Series

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PRINTED IN JAPAN

by Tokyo Shoseki Printing Co., Ltd.

Preface

The 12th MSJ International Research Institute of the Mathematical Society of Japan 2003 “*Singularity theory and its applications*” was held on Sapporo convention center “SORA”, September 16–25, 2003. The conference was attended by 146 mathematicians, 77 of them from 17 different countries outside of Japan, and there were 97 talks. The programme covered a broad range of topics in singularity theory and its applications. The local organizers were S. Izumiya, G. Ishikawa, I. Shimada and T. Sano. The scientific committee consisted of Professors J. Damon (Chapell-Hill), T. Fukuda (Tokyo), S. Janeczko (Warsaw), M. Oka (Tokyo), M. A. Ruas (Sao Carlos), K. Saito (Kyoto), D. Siersma (Utrecht), C. T. C. Wall (Liverpool) and V. Zakalyukin (Moscow). Professor Heisuke Hironaka (Tokyo) was the advisor of the conference. The local organizers would like to thank all the members of the scientific committee and the advisor.

The papers presented here are selection of those submitted to the editors for the publication in the proceedings of the meeting. They cover several important topics in singularity theory such as motivic integrations, Thom polynomials, complex analytic singularity theory, Lagrangian singularity theory, generic differential geometry etc. All papers were refereed and in final form. We would like to express our gratitude to the authors and the many referees.

We gratefully acknowledge financial support from Mathematical Society of Japan; Grant-in-Aid for Scientific Research, JSPS; Ministry of Education, Culture, Sports Science and Technology, Japan; Sapporo International Communication Plaza Foundation; Grant-in-Aid for formation of COE “Mathematics of Nonlinear structure via Singularities”(Hokkaido University). We also thank to the staff at Department of Mathematics, Hokkaido University for their enormous help and support. Finally many thanks to Atsuko Ogino and Megumi Sasamori for doing so much of the editorial work of this volume in their friendly and efficient manner.

Sapporo, December 2005

Shyuichi Izumiya, Goo Ishikawa, Hiroo Tokunaga,
Ichiro Shimada, Takasi Sano
Editors

*All papers in this volume have been refereed and are in final form.
No version of any of them will be submitted for publication elsewhere.*

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**ADVANCED STUDIES
IN PURE MATHEMATICS 44**

Chief Editor: Toshitake Kohno (The University of Tokyo)

Potential theory in Matsue

Edited by

Hiroaki Aikawa (Hokkaido University)
Takashi Kumagai (RIMS, Kyoto University)
Yoshihiro Mizuta (Hiroshima University)
Noriaki Suzuki (Nagoya University)

Mathematical Society of Japan

This book was typeset by $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathrm{T}\mathrm{E}\mathrm{X}$ and $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathrm{L}\mathrm{A}\mathrm{T}\mathrm{E}\mathrm{X}$, the $\mathrm{T}\mathrm{E}\mathrm{X}$ macro systems of the American Mathematical Society, together with the style files `aspm.sty` and `aspmfm.sty` for $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathrm{T}\mathrm{E}\mathrm{X}$ written by Dr. Chiaki Tsukamoto and `aspmproc.sty` for $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathrm{L}\mathrm{A}\mathrm{T}\mathrm{E}\mathrm{X}$ written by Dr. Akihiro Munemasa.

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Edited by the Mathematical Society of Japan.

Published by the Mathematical Society of Japan.

Distributed by the Mathematical Society of Japan, the American Mathematical Society and the World Scientific Publishing Co. Ltd.

Distributed exclusively in North America by the American Mathematical Society.

Partially supported by Grant-in-Aid for Publication of Scientific Research Results, Japan Society for the Promotion of Science.

ISBN 4-931469-33-7

2000 Mathematics Subject Classification.

Primary 31-xx.

Secondary 31Bxx, 31Cxx, 32Axx, 32Uxx, 35Bxx, 35Cxx, 35Gxx, 35Jxx, 35Kxx, 35Pxx, 37Fxx, 39Bxx, 42Bxx, 46Exx, 58Jxx, 60Gxx, 60Hxx, 60Jxx.

Advanced Studies in Pure Mathematics 44

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PRINTED IN JAPAN

by Tokyo Shoseki Printing Co., Ltd.

Preface

This volume collects, in written form, eight plenary lectures and twenty-five selected contributions from invited and contributed lectures delivered at the International Workshop on Potential Theory 2004. The workshop was held at Shimane University, Matsue, Japan, from 23 to 28 August, 2004. There were 19 plenary lectures and 35 invited and contributed lectures with 77 participants coming from 15 countries.

The topic of the workshop was Potential Theory and its related fields. There were stimulus talks from classical potential theory to pluri-potential theory and probabilistic potential theory. The organizing committee consisted of Hiroaki Aikawa (chairman), Takashi Kumagai, Fumi-Yuki Maeda, Hiroaki Masaoka, Yoshihiro Mizuta, Minoru Murata, Masaharu Nishio, Takeo Ohsawa, Katsunori Shimomura, Noriaki Suzuki, Maretsugu Yamasaki; together with local organizers at Shimane University, Daishi Kuroiwa, Shuji Machihara, Toshihiro Nakanishi and Hiroyuki Tsutsumi.

We are very grateful to all institutions and individuals who have supported the workshop. We would like to express our sincere thanks to Professor Masatoshi Fukushima and Professor Jun Kigami who are willing to deliver plenary lectures as well as to support international participants. Professor Junjiro Noguchi kindly offers his grant to invite many participants. His grant is one of our main resources. Professor Minoru Murata, Professor Masaharu Nishio and Professor Takeo Ohsawa of the IWPT organizers also help international participants financially. We would like to acknowledge the supports by

Shimane Prefecture,
Matsue City,
Grant-in-Aid for Scientific Research, Japan Society for the
Promotion of Science.

Their generous supports were necessary for the workshop as well as for this volume of the proceedings.

The present volume owes much to the selfless service of many referees who carefully read the submitted the manuscripts. Finally, our thanks go to Ms Yuko Kameda at the COE program office of Hokkaido University for her help in the preparation of the final manuscripts.

Sapporo, March 2006

The Editors:
Hiroaki Aikawa (Chief)
Takashi Kumagai
Yoshihiro Mizuta
Noriaki Suzuki

*All papers in this volume have been refereed and are in final form.
No version of any of them will be submitted for publication elsewhere.*

International Workshop on Potential Theory 2004, Matsue

Venue: Shimane University, Matsue, Japan

Period: August 23–28, 2004

Monday, August 23

18:00-20:00 IWPT Reception

Tuesday, August 24

9:25-9:30 IWPT opening

Plenary lectures

9:30-10:30 **Stephen J. Gardiner**
Radial limits of harmonic functions

11:00-12:00 **Jun Kigami**
Resistance forms and heat kernel estimates on fractals

12:00-12:10 **Photo**

13:30-14:30 **Nageswari Shanmugalingam**
Dirichlet forms and Newton-Sobolev spaces for metric spaces supporting Poincaré inequalities

Lectures in parallel sessions

15:00-15:30 **Olli Martio**
Poisson modifications for quasisuperminimizers

Jürgen Bliedtner
Convergence properties of semi-elliptic differential operators

Manfred Stoll
On generalizations of the Littlewood-Paley inequalities to domains in \mathbb{R}^n ($n \geq 2$)

15:45-16:15 **Jana Björn**
Boundary regularity for p -harmonic functions on metric spaces

Klaus Janssen

Integral representation for space-time excessive functions

Hong Rae Cho

Capacitary inequalities for mean Lipschitz spaces on the unit ball in \mathbb{C}^n

16:30-17:00

Takayori Ono

Hölder continuity of solutions to quasilinear elliptic equations with measure data

Torbjörn Lundh

Minimally thin sets below a function graph

E. G. Kwon

M-subharmonic Hardy functions on the complex ball

17:15-17:45

Shin-ichi Ohta

Cheeger-type Sobolev spaces for metric space targets

Kentaro Hirata

An estimate for the product of the Green function and the Martin kernel

Yūsuke Okuyama

Poincaré functions and the value distributions in complex dynamics

Wednesday, August 25

Plenary lectures

9:30-10:30

Krzysztof Burdzy

Neumann eigenfunctions and Brownian couplings

11:00-12:00

Pekka Koskela

One-dimensional measure of a preimage

13:30-14:30

Jang-Mei Wu

Quasiconformal deformation of self-similar sets and applications

Lectures in parallel sessions

15:00-15:30

Minoru Murata

Representations of nonnegative solutions for parabolic equations

- Rikio Yoneda**
The essential norm of the integration operators and Multipliers on Bergman spaces
- Takahide Kurokawa**
On a decomposition of the Schwartz class
- 15:45-16:15 **Yehuda Pinchover**
Large time behavior of the heat kernel
- Katsuya Ishizaki**
Borel and Julia directions of meromorphic Schröder functions
- Yoichi Miyazaki**
The L^p resolvents for elliptic systems of divergence form
- 16:30-17:00 **Fausto Di Biase**
On tangential approach regions for bounded harmonic functions in the unit disc
- Akane Iwamura**
Estimates of the α -Riesz potentials in metric spaces
- Minoru Yanagishita**
On the behavior at infinity for non-negative superharmonic functions in a cone
- 17:15-17:45 **Kohur GowriSankaran and David Singman**
Boundary behaviour on trees
- Hisako Watanabe**
Estimates of maximal functions by Hausdorff contents in a metric space
- I. Miyamoto and H. Yoshida**
A covering theorem and a quantitative property of minimally thin sets in a cone

Thursday, August 26

Plenary lectures

- 9:30-10:30 **Masatoshi Fukushima**
Trace Dirichlet forms and related topics
- 11:00-12:00 **Stephanie Nivoche**
A Hilbert lemniscate theorem in \mathbb{C}^n

Friday, August 27**Plenary lectures**

- 9:30-10:30 **Yves Guivarc'h**
Martin boundaries of skew products, and orbit closures of linear group actions
- 11:00-12:00 **Joaquim Ortega and Kristian Seip**
Harmonic measure in Swiss cheeses
- 13:30-14:30 **Tom Carroll**
Harmonic measure in parabola-shaped regions in \mathbb{R}^n

Lectures in parallel sessions

- 15:00-15:30 **Krzysztof Bogdan (joint work with Paweł Sztonyk)**
Harnack's inequality for stable Lévy processes
- Tero Kilpeläinen**
 p -Laplacian problems near the boundary
- Hiroaki Masaoka**
Quasiconformal mapping and the minimal Martin boundary of covering surfaces of the punctured Riemann sphere $\hat{\mathbb{C}} \setminus \{0\}$ of Heins type
- 15:45-16:15 **Renming Song**
Potential theory of special subordinators and subordinate killed Brownian motions
- Hyungwoon Koo**
Holomorphic mean Lipschitz spaces
- Tetsu Shimomura**
Sobolev embeddings for variable exponent Riesz potentials
- 16:30-17:00 **Katsunori Shimomura**
The caloric morphism for radial metrics on semi-euclidean spaces.
- Boo Rim Choe**
Non-orthogonal projections for harmonic Bergman spaces
- Yoshihiro Mizuta**
Continuity properties for weakly monotone Sobolev functions
- 17:15-17:45 **Masaharu Nishio, Katsunori Shimomura and Noriaki Suzuki**

L^p -boundedness of Bergman projections for α -parabolic operators

Premalatha and A. K. Kalyani

Some potential theoretic results on an infinite network

Saturday, August 28

Plenary lectures

- | | |
|-------------|--|
| 9:30-10:30 | Zbigniew Błocki
The Bergman kernel and pluripotential theory |
| 11:00-12:00 | Wolfgang Hansen
Global comparison of perturbed Green functions |

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**ADVANCED STUDIES
IN PURE MATHEMATICS 45**

Chief Editor: Toshitake Kohno (The University of Tokyo)

**Moduli Spaces and Arithmetic
Geometry (Kyoto, 2004)**

Edited by

Shigeru Mukai (RIMS, Kyoto University)

Yoichi Miyaoka (University of Tokyo)

Shigefumi Mori (RIMS, Kyoto University)

Atsushi Moriwaki (Kyoto University)

Iku Nakamura (Hokkaido University)

Mathematical Society of Japan

This book was typeset by \AA MS-TEX and \AA MS-LATEX , the \TeX macro systems of the American Mathematical Society, together with the style files `aspm.sty` and `aspmfm.sty` for \AA MS-TEX written by Dr. Chiaki Tsukamoto and `aspmproc.sty` for \AA MS-LATEX written by Dr. Akihiro Munemasa.

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Edited by the Mathematical Society of Japan.

Published by the Mathematical Society of Japan.

Distributed by the Mathematical Society of Japan, the American Mathematical Society and the World Scientific Publishing Co. Ltd.

Distributed exclusively in North America by the American Mathematical Society.

Partially supported by Grant-in-Aid for Publication of Scientific Research Results, Japan Society for the Promotion of Science.

ISBN 978-4-931469-38-9

2000 Mathematics Subject Classification.

Primary 14-06.

Secondary 11-06, 32-06.

Advanced Studies in Pure Mathematics 45

Chief Editor

Toshitake Kohno (Univ. of Tokyo)

Editorial Board of the Series

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PRINTED IN JAPAN

by Tokyo Shoseki Printing Co., Ltd.

Preface

Since its birth algebraic geometry has been closely related to and deeply motivated by number theory. Particularly the modern study of moduli spaces and arithmetic geometry have many important techniques and ideas in common. With this close relation in mind, the RIMS conference “Moduli Spaces and Arithmetic Geometry” was held at Kyoto University during September 8–15, 2004 as the 13th International Research Institute of the Mathematical Society of Japan (MSJ-IRI). This volume is the outcome of this conference and consists of thirteen papers, which were rigorously refereed. We would like to thank all the referees for their contribution to this volume.

November 2006

Editorial Committee
Shigeru Mukai (Chief)
Yoichi Miyaoka
Shigefumi Mori
Atsushi Moriwaki
Iku Nakamura

*All papers in this volume have been refereed and are in final form.
No version of any of them will be submitted for publication elsewhere.*

This volume is respectfully dedicated to

Prof. Masaki Maruyama

on his sixtieth birthday in 2004
from all of us who owe so much to him
through both his works and personal guidance.

**The 13th Mathematical Society of Japan
International Research Institute
— Moduli Spaces and Arithmetic Geometry —**

The conference “Moduli Spaces and Arithmetic Geometry” was held in 2004, when Professor Masaki Maruyama turned sixty (*kanreki* in Japanese). Professor Maruyama received his Bachelor of Arts in 1967, his Master of Arts in 1969, and his Dr. of Sci. in 1972, all from Kyoto University. He published parts of his master’s thesis as a book, which was quite unusual in mathematics. In his master’s and doctoral theses, he established the theory of elementary transformation, a construction principle of algebraic vector bundles over bases of dimension up to three. He became a research associate of Kyoto University after he received his MA, and visited Harvard University for one year after he received his Dr. of Sci. Since this visit, he has been working on various aspects of moduli problems*. He has visited many places overseas and supervised scores of students.

In this conference, there were 153 participants including 20 from overseas. There were five series lectures and eight one-hour lectures by invited speakers. The present volume consists of eight articles by invited speakers and five by participants. We thank all the speakers and participants for their invaluable contributions, which made the conference most successful.

The conference was supported by the Mathematical Society of Japan, Research Institute for Mathematical Sciences (RIMS) and the Grant-in-Aid for Scientific Research[†] of the Japan Society of Promotion of Science. We are grateful for their generous financial support.

November 2006

Organizing Committee

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Yoichi Miyaoka

Shigefumi Mori

Iku Nakamura

Masa-Hiko Saito

Fumiharu Kato

*The list of his publications is in the following pages.

[†](A)(1) No. 14204001 (S. Kondo), (A)(1) No. 16204001 (I. Nakamura) and (B)(1) No. 16340009 (M.-H. Saito).

1. (with M. Nagata) Note on the structure of a ruled surface, *J. Reine Angew. Math.* **239/240** (1969), 68–73.
2. On classification of ruled surfaces, *Lectures in Mathematics, Department of Mathematics, Kyoto University*, **3**, Kinokuniya Book-Store Co., Ltd., Tokyo, 1970, iv+75 pp.
3. On automorphism groups of ruled surfaces, *J. Math. Kyoto Univ.* **11** (1971), 89–112.
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5. Stable vector bundles on an algebraic surface, *Nagoya Math. J.* **58** (1975), 25–68.
6. Openness of a family of torsion free sheaves, *J. Math. Kyoto Univ.* **16** (1976), no. 3, 627–637.
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11. The theorem of Grauert-Mülich-Spindler, *Math. Ann.* **255** (1981), no. 3, 317–333.
12. On boundedness of families of torsion free sheaves, *J. Math. Kyoto Univ.* **21** (1981), no. 4, 673–701.
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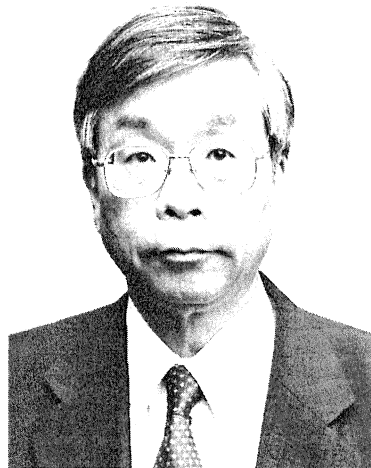
15. Algebraic vector bundles, '*Recent progress of algebraic geometry in Japan*', pp. 106–151, North-Holland Math. Stud., **73**, North-Holland, Amsterdam, 1983.
16. Singularities of the curve of jumping lines of a vector bundle of rank 2 on \mathbf{P}^2 , '*Algebraic geometry (Tokyo/Kyoto, 1982)*', pp. 370–411, Lecture Notes in Math., **1016**, Springer-Verlag, Berlin, 1983.
17. Stable rationality of some moduli spaces of vector bundles on \mathbf{P}^2 , '*Complex analysis and algebraic geometry (Göttingen, 1985)*', pp. 80–89, Lecture Notes in Math., **1194**, Springer-Verlag, Berlin, 1986.
18. On a generalization of elementary transformations of algebraic vector bundles, '*Conference on algebraic varieties of small dimension (Turin, 1985)*', Rend. Sem. Mat. Univ. Politec. Torino, Special Issue, 1–13 (1987).
19. The equations of plane curves and the moduli spaces of vector bundles on \mathbf{P}^2 , '*Algebraic and topological theories (Kinosaki, 1984) — to the memory of Dr. Takehiko Miyata*', pp. 430–466, Kinokuniya, Tokyo, 1986.
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25. (with G. Trautmann) Limits of instantons, *Internat. J. Math.* **3** (1992), no. 2, 213–276.
26. (with K. Yokogawa) Moduli of parabolic stable sheaves, *Math. Ann.* **293** (1992), no. 1, 77–99.
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30. *Gröbner bases and their application*, (Japanese), Kyoritsu Shuppan Co., Ltd., Tokyo, 2002, ix + 258 pp.



Professor Maruyama

Program

Dates: September 8–15, 2004

Venue: Research Institute for Mathematical Sciences, Kyoto University, Kyoto, Japan

September 8 (Wednesday)

- 13:00–13:15 Opening
- 13:15–14:15 **S. Mukai** (RIMS)
Moduli of vector bundles, I.
- 14:30–15:30 **C. Soulé** (IHES)
Arakelov Geometry, I.
- 16:30–17:30 **I. Nakamura** (Hokkaido)
Degenerate abelian varieties of type E_8 .

September 9 (Thursday)

- 10:00–11:00 **C. Faber** (Stockholm)
Cohomology of local systems on moduli spaces of curves and of abelian varieties, I.
- 11:15–12:15 **C. Soulé** (IHES)
Arakelov Geometry, II.
- 14:00–15:00 **C. Voisin** (Paris)
On homotopy types of Kähler compact manifolds and the Kodaira problem.
- 16:00–17:00 **A. Beauville** (Nice)
Vector bundles on curves and theta functions.

September 10 (Friday)

- 10:00–11:00 **C. Faber** (Stockholm)
Cohomology of local systems on moduli spaces of curves and of abelian varieties, II.
- 11:15–12:15 **C. Soulé** (IHES)
Arakelov Geometry, III.
- 14:00–15:00 **Y. Laszlo** (Paris)
Vector bundles in positive characteristic.
- 16:00–17:00 **S. Mukai** (RIMS)
Moduli of vector bundles, II.

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September 13 (Monday)10:00–11:00 **K. Fujiwara** (Nagoya), **F. Kato** (Kyoto)

Rigid geometry, I.

11:15–12:15 **C. Faber** (Stockholm)

Cohomology of local systems on moduli spaces of curves and of abelian varieties, III.

14:00–15:00 **S. Mochizuki** (RIMS)

Anabelian Geometry from an Inter-universal Point of View, I.

16:00–17:00 **K. Kato** (Kyoto)

Moduli spaces of Hodge structures and log abelian varieties.

September 14 (Tuesday)10:00–11:00 **K. Fujiwara** (Nagoya), **F. Kato** (Kyoto)

Rigid geometry, II.

11:15–12:15 **S. Mochizuki** (RIMS)

Anabelian Geometry from an Inter-universal Point of View, II.

14:00–15:00 **R. Hain** (Duke)

On the symplectic cohomology of hyperelliptic mapping class groups.

16:00–17:00 **N. Nitsure** (TIFR)Moduli of regular holonomic D -modules with natural parabolic semi-stability**September 15 (Wednesday)**10:00–11:00 **K. Fujiwara** (Nagoya), **F. Kato** (Kyoto)

Rigid geometry, III.

11:15–12:15 **S. Mochizuki** (RIMS)

Anabelian Geometry from an Inter-universal Point of View, III.

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**ADVANCED STUDIES
IN PURE MATHEMATICS 46**

Chief Editor: Toshitake Kohno (The University of Tokyo)

**Singularities in Geometry and
Topology 2004**

Edited by

Jean-Paul Brasselet (Institut de Mathématiques de Luminy)
Tatsuo Suwa (Niigata University)

Mathematical Society of Japan

This book was typeset by \AA MS-TEX and \AA MS-LATEX , the \TeX macro systems of the American Mathematical Society, together with the style files `aspm.sty` and `aspmfm.sty` for \AA MS-TEX written by Dr. Chiaki Tsukamoto and `aspmproc.sty` for \AA MS-LATEX written by Dr. Akihiro Munemasa.

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Edited by the Mathematical Society of Japan.

Published by the Mathematical Society of Japan.

Distributed by the Mathematical Society of Japan, the American Mathematical Society and the World Scientific Publishing Co. Ltd.

Distributed exclusively in North America by the American Mathematical Society.

Partially supported by Grant-in-Aid for Publication of Scientific Research Results, Japan Society for the Promotion of Science.

ISBN 978-4-931469-39-6

2000 Mathematics Subject Classification.

12D10, 13A18, 14B05, 14C05, 14C17, 14C22, 14D05, 14E15, 14E20, 14G17, 32A27, 32B20, 32S05, 32S10, 32S15, 32S25, 32S45, 32S60, 53D35, 58k05.

Advanced Studies in Pure Mathematics 46

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Toshitake Kohno (Univ. of Tokyo)

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PRINTED IN JAPAN

by Tokyo Shoseki Printing Co., Ltd.

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序文

日本数学会刊行シリーズ Advanced Studies in Pure Mathematics の一つとして出版されるこの巻は 2004 年 9 月 13 日から 18 日まで北海道大学（札幌）で開催された日仏特異点シンポジウム“幾何学とトポロジーにおける特異点”の報告集です。これは同標題の第三回目のシンポジウムです：第一回の日仏特異点シンポジウムは 1998 年 7 月 6 日から 10 日まで北海道大学で開催され、その報告集はこのシリーズ Advanced Studies in Pure Mathematics の第 29 巻として 2000 年に出版されました。また第二回は 2002 年 9 月 9 日から 13 日まで CIRM（マルセイユ・リュミニ）で開催され、その報告集はフランス数学会刊行シリーズ Séminaires et Congrès の第 10 巻として 2005 年に出版されています。

特異点理論における日仏の協力関係は古く、それは 1970 年代の廣中平祐のフランス滞在を契機に具体化されました。日本学術振興会と CNRS の協力事業および PICS (科学協力国際プログラム) により相互派遣、研究交流が可能となり、また日仏両国におけるポストドックに財政援助が与えられました。

北海道大学における今回のシンポジウムは日本学術振興会と CNRS の日仏協力事業“日仏セミナー”の一つとして組織されました。主に日仏両国、またドイツ、イラン、メキシコ、ロシア、トルコ、アメリカ合衆国、ベトナムなどの諸国より計 60 名の参加者がありました。講演は 23 あり、主として特性類、留数、階層化、曲線および曲面の特異点、附値、特異点の解消、トーリック多様体などの主題について行われました。

フランス大使館からは、駐日大使 Bernard de Montferrand 氏に開会式に御挨拶をして頂く光栄に浴しました。また科学技術顧問 Michel Israël 氏が参加して下さったことにも感謝いたします。フランス大使館をはじめ、このシンポジウムの実現に援助して下さい下さった方々、特に日本学術振興会、CNRS に感謝いたします。東京の CNRS 事務局にも支援をして頂きました。最後になりましたが、有能、意欲的かつ懇切な尽力によりこのシンポジウムを真に成功させて下さった北海道大学 COE 事務員の方々にお礼申し上げます。

Jean-Paul Brasselet, 諏訪 立雄

PRÉFACE

Ce volume de la Série Advanced Studies in Pure Mathematics de la Société Mathématiques du Japon constitue les Actes du Colloque Franco-Japonais de Singularités en Géométrie et Topologie, tenu à l'Université d'Hokkaido (Sapporo, Japon) du 13 au 18 Septembre 2004. Il s'agit du troisième colloque de ce nom : le premier colloque Franco-Japonais de Singularités s'est tenu à l'Université d'Hokkaido du 6 au 10 Juillet 1998 et a été publié comme volume de la présente Série, Advanced Studies in Pure Mathematics, volume 29, 2000, le second s'est tenu au CIRM, à Marseille-Luminy du 9 au 13 Septembre 2002 et a été publié comme volume de la Série Séminaires et Congrès de la Société Mathématiques de France, Numéro 10, 2005.

La coopération franco-japonaise dans le domaine des singularités est ancienne et s'est concrétisée à l'occasion des séjours en France du Professeur Heisuke Hironaka dans les années 1970. Un accord bilatéral CNRS/JSPS puis un PICS (Programme International de Coopération Scientifique) ont permis de réaliser des missions de travail, des rencontres et ont servi de support à des postes de post-doctorants au Japon et en France.

Le colloque de Sapporo a été organisé comme "Séminaire bilatéral conjoint" franco-japonais CNRS/JSPS et comme l'une des activités du PICS. Il a rassemblé 60 participants, essentiellement du Japon et de France, mais aussi d'autres pays tels que Allemagne, Iran, Mexique, Russie, Turquie, USA, Viet Nam. Les conférences, au nombre de 23, ont eu comme thèmes principaux les classes caractéristiques, les résidus, les stratifications, les singularités de courbes et de surfaces, les valuations, la résolution des singularités, les variétés toriques.

Monsieur Bernard de Montferrand, Ambassadeur de

France au Japon, nous a fait l'honneur de présider la séance d'ouverture. Nous tenons à l'en remercier ainsi que Monsieur Michel Israël, Conseiller pour la Science et la Technologie, lequel a participé aux activités du congrès. Outre l'aide précieuse de l'Ambassade de France nous avons bénéficié du support de la JSPS et du CNRS ; la représentation du CNRS à Tokyo, en la personne de Denis Perret-Gallix, nous a apporté son soutien. Nous les en remercions ainsi que toutes celles et tous ceux qui nous ont aidé à réaliser ce colloque. Nos remerciements vont tout particulièrement au secrétariat du COE du Département de Mathématiques de l'Université d'Hokkaido qui par sa compétence, sa disponibilité et sa gentillesse, a permis de faire de ce colloque un réel succès.

Jean-Paul Brasselet
Tatsuo Suwa

フランス大使講演要旨

駐日フランス大使 Bernard de Montferrand 氏はシンポジウムの開会式に臨席されました。氏の御講演の原稿は東京のフランス大使館の御好意により、この巻にフランス語で掲載させていただきます。これは日本語によるその要旨です。

数学はフランスおよび日本に共通した優れた分野ですので、大使がこの数学のシンポジウムに出席するのは適切なことだと思います。日本はフランスと同様、偉大な数学者を生み出しています。基礎的研究における二国間の協力は豊富で実り多いものです。基礎的研究は技術の進歩の源にあり、数学は知的活動の本質です。

特異点理論は日仏科学協力のシンボルです。特異点理論における日仏間の最初の接触は 1968 年の廣中平祐のフランス IHES への訪問に遡ります。特異点理論における多くの日本人数学者がフランス語を話すのは注目すべき点です。諏訪立雄と Jean-Paul Brasselet を責任者とする、1995 年から 2001 年の CNRS と JSPS 間の特異点における協力事業により、我々二つのグループ間の協力が具体化されました。そしてこれは 2001 年からの CNRS の PICS (科学協力国際プログラム) により引き継がれました。次の二つの特異点日仏シンポジウムががこの事業の結果です：1998 年の札幌、2002 年のマルセイユ。このシンポジウムは三番目のものです。

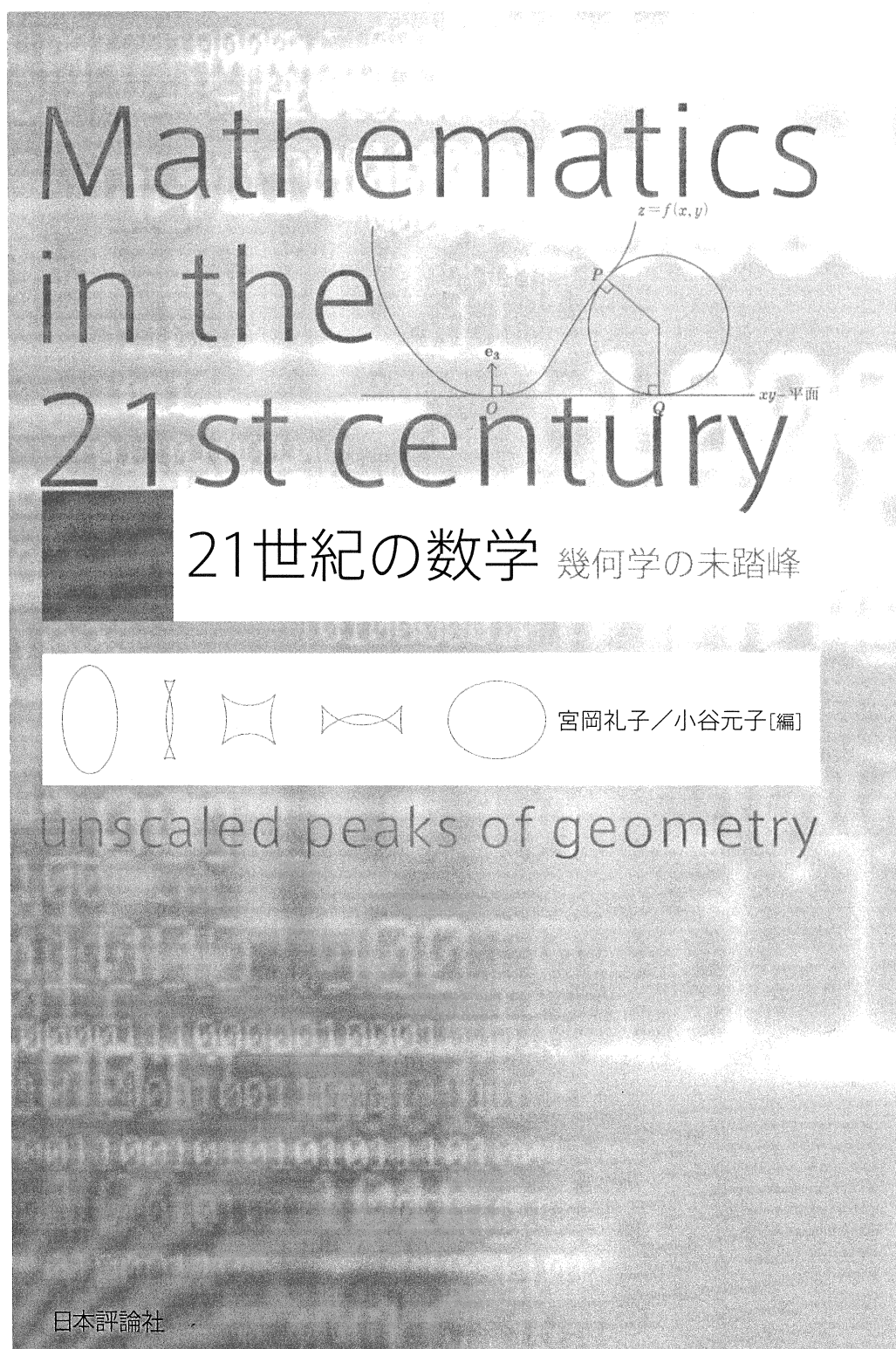
廣中平祐教授も日仏科学協力のシンボルです。彼の業績はフィールズ賞、1975 年の文化勲章などにより認められています。廣中氏は我々二国間の科学協力の発展に継続的に尽くしておられます。2004 年 1 月、フランス最高の栄誉であるレジオン・ドヌール勲章を受けられたのはこのためです。

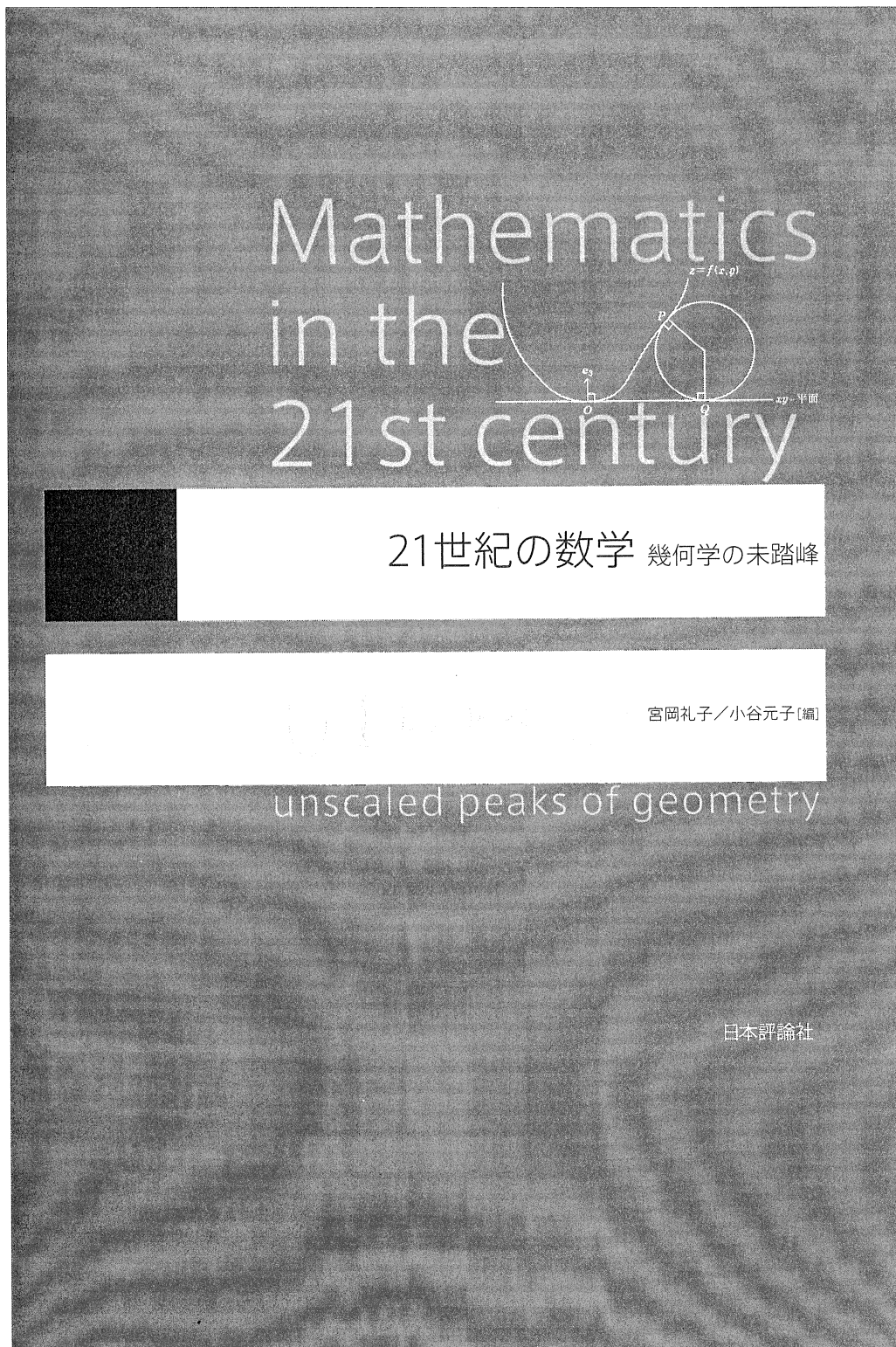
日仏間の科学協力の力強さは一目瞭然です。我々は堅実で実りある研究を発展させなければなりません。そして日仏間に存在する潜在能力は我々の科学協力を一層の推進させるでしょう。あなたがたはこのような協力の成功例です。フランスはあなたがたに感謝します。

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7.13 21 世紀の数学 —幾何学の未踏峰— 表紙, 序文, 目次





まえがき

数学をやっていると、「数学で解けてない問題なんてあるの？」ときかれることがあります。小学校、中学校で苦しめられた代数方程式や平面幾何を想定してのことでしょう。

この本にはまさに解けていない問題が、満載されています。その中には、解ければ学位に値するものや、フィールズ賞に値するものも含まれています。ですが、ひとつ注意があります。問題は本来自分で探すもの、ここにあげられた問題と解説はあくまでも指針です。特に前半の論説中には、リストアップされていない隠れた問題が行間にいくつも述べられています。じっくり読んで自分で問題を探してください。

出版に当たっては学部学生も手に取れる問題集というイメージがありました。この点について次のエピソードを紹介します。2002年に「数理の翼夏期セミナー」の講師を仰せつかったときのことです。このセミナーは広中平佑氏が企画された¹⁾、数学に限らず、最先端の科学をおもに高校生に紹介する合宿形式の活動で、参加者からは既に多くの数学者が育っています。さて、セミナーの講演前日に現地に到着すると、広中先生が開口一番、「やさしい話はしないでください、相手を高校生だと思わないでください」とおっしゃったのです。広中氏のこの言葉が本書の基本です。むずかしく手が届かなく思えても本物に触れることが重要だということです。

一方、実際本書に目を通してみると、1つの解説が10ページ内外と適当な量のためか意外に(?)読みやすく、またテーマの面白みの伝わってくる解説がたくさんあることを感じます。以下に少し紹介しましょう。

微分幾何学でも特異点を扱う問題が重要な位置を占めるようになってきました。

¹⁾ 現在は NPO 法人数理の翼が主催しています。

扱う対象や目的は異なりますが、梅原氏、太田氏は特異性から不変量を探るというトピックを語っています。

小林亮一氏の解説は、幾何の人には後半から読む方が身近に思えるかもしれません。リーマン幾何学と統計力学との尋常ならざる深い関係が示唆されているという、ペレルマンの文献も引用されます。一方、黒瀬氏は成人式を迎えても大人になりきれない(?)統計多様体について述べています。

藤木氏は、有名な S^6 には複素構造が入るかという問題から始め、複素幾何学の 30 題の問題を明解に解説しました。

二木氏は素人が読んでもきっと興味を覚えるに違いない美しい問題をあげています。森吉氏が述べる指数定理の役割は、非可換幾何学という新しい立場からも、二木氏のテーマや、二木不変量との関連が顔をのぞかせる興味深い話です。

塩濱氏は放射曲率という現在進行中のテーマの中で、若い院生たちの最新結果も多数とりあげました。

山口孝男氏は、いま最も興味をもたれているペレルマンのリッチ流を用いる 3 次元多様体の幾何化予想に関する話題を、この問題にとり組む第一線の著者自身の結果もあわせ、胸躍る解説としてのべています(書き手は冷静です)。加須栄氏による塩谷氏、山口氏の話題と関連する解説は読みやすく、良い導入になっているでしょう。

今野氏はスペシャル幾何学の中のハイパーケーラー多様体について語り、続く後藤氏の壮大な統一理論への興味をよび起こしてくれます。

佐武氏は、擬対称領域から定義される尖点特異点の幾何学的不変量とゼータ関数のある値の関係を予想し、整数論につながる特色のある内容になりました。長野氏の対称空間論は、対称 R 空間の創始者としての、本質をついた分かりやすい解説です。

芥川氏のブラックホールやトータルマスに関するペンローズ予想の解説は、数学の根底にある物理現象の解明に、極小曲面や逆平均曲率流といった幾何学的手法が重要な役割を果たすことを指摘しています。

そして深谷氏は、「若い人はこのレベルのものを一度ぐらいいは解きたいと思って研究してほしい」と、53 題の問題に難易度 1~5 をつけて掲げました。どの問題も定義や背景を解説するだけで本になってしまうようなものですが、要所要所に

適切な文献があげられていて大変親切です。

その他スペースの都合ですべてを紹介できず残念ですが、いずれも熱意あふれる好編です。この本を手元におき、折々にぜひ目を通してみてください。

本書の原型は 2003 年 8 月 21 日から 24 日にかけて、北海道大学で開催された第 50 回幾何学シンポジウムの講演アブストラクトです。2003 年が第 50 回の幾何学シンポジウムの年であることを小谷元子さんから指摘され、記念企画として未解決問題を集めたらどうかとの具体的な提案もありました。さらに、シンポジウムでは最先端の研究者に問題提起とその解説をお願いして、若い研究者の育成につなげようという話に進みました。講演者にはあらかじめ記録集を残す可能性をお伝えし、アブストラクト段階から熱のはいった原稿をいただき、これをブラッシュアップしたのが本書です。著者の方々に深く感謝するものです。

2002 年 12 月から 2003 年 10 月までは、インターネットを通じて未解決問題の公募が行われ、小谷さんと、名古屋大の内藤久資さん、都立大の酒井高司さんの協力により、100 題余の問題を集め、整理することができました。問題提出者に心より感謝します。これらは審査なしに掲載することを原則とし、また必ずしも提出者が初めて出した問題とは限らず、昔からの有名な問題や、多くの人の間で共通の問題とされているものも含んでいます。このほか 200 題をこえる問題が論説中にあげられており、問題総数は 300 をこえるものとなっています。

シンポジウムの歴史については小林昭七氏の記事をお読みください。氏がシンポジウムの経緯を詳細に調べられたのをきっかけに、過去の講演者と講演題目を幾何学学科会ホームページに記録することになり、福岡大の濱田龍義さんの協力により、既に全ての記録が下記に掲載されています。

<http://geom.math.metro-u.ac.jp/wiki/index.php?>

また、落合卓四郎氏の提案と協力により、過去及び今後の講演要旨をすべて東京大学数理科学研究科図書室に集めることが実現しました。Survey シリーズについても準備中です²⁾。

本書は 2003 年度の幾何学学科会幹事会メンバーを中心とする 7 名の編集委員

²⁾ ix ページを参照。

が編集しました。査読等で多くの方の協力を得たこと、西川青季氏（東北大）の資金援助、カバーデザインには山田光太郎氏（九州大）、古畑仁氏（北海道大）の協力があったこと、また日本評論社の佐藤大器氏に大変お世話になりましたことを深く感謝します。最後に公募問題も含め、本書の内容についての責任は全て編集委員会が負うものいたします。

（2004 年 5 月、宮岡礼子記）

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8 招聘研究者

1. Tom Y. H. Wan (Chinese University of Hong Kong, 副教授), 2003 年 7 月 11 日 – 7 月 19 日, 2003 年 7 月 27 日 – 8 月 8 日, 2004 年 3 月 3 日 – 3 月 8 日.
2. Elisabetta Barletta (Università della Basilicata, 副教授), 2003 年 9 月 3 日 – 9 月 21 日.
3. Sorin Dragomir (Università della Basilicata, 教授), 2003 年 9 月 3 日 – 9 月 21 日.
4. Thomas K. K. Au (Chinese University of Hong Kong, 副教授), 2003 年 12 月 16 日 – 12 月 27 日.
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6. David Ruddy (Cornell University Library, Head of Systems Development and Production), 2005 年 1 月 21 日 – 1 月 29 日.
7. Philippe Tondeur (University of Illinois at Urbana-Champaign, 教授), 2005 年 1 月 21 日 – 2 月 3 日.
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9. Miguel Abreu (Instituto Superior Tecnico, 副教授), 2005 年 2 月 21 日 – 2 月 25 日.
10. Jingyi Chen (University of British Columbia, 副教授), 2005 年 2 月 21 日 – 2 月 25 日.
11. Peter Topping (University of Warwick, 副教授), 2005 年 2 月 21 日 – 2 月 26 日.
12. Jiaping Wang (University of Minnesota, 副教授), 2005 年 2 月 21 日 – 2 月 26 日.
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16. Zejun Hu (Zengzhou University, 教授), 2007 年 1 月 6 日 – 1 月 19 日.
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9 出版物送付先

9.1 Advanced Studies in Pure Mathematics, Vol. 33 – Vol. 46 送付先

発送先	機関名	所在地
1	名古屋大学大学院多元数理科学研究科	名古屋市千種区不老町
2	京都大学数理解析研究所	京都市左京区北白川追分町
3	バークレー数理科学研究所 Mathematical Sciences Research Institute	1000 Centennial Drive Berkeley, CA 94720 U.S.A
4	プリンストン高等数学研究所 The Institute for Advanced Study	Princeton, NJ 08540 U.S.A.
5	ハーバード大学 Birkhoff Mathematics Library Department of Mathematics Harvard University Science Center	One Oxford Street Cambridge, MA 02138 U.S.A.
6	I.H.E.S. Insititute des Hautes Etudes Scientifiques	91442 Bures-sur-Yvette France
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11	レニングラード大学 The Gorky Scientific Library St. Petersburg State University	Universiteskaya nab. 7/9 St. Petersburg 199164 Russia
12	南開数学研究所 Nannkai Institute of Mathematics Nannkai University	Tianzin People's Republic of China
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17	復旦大学 Library Institute of Mathematics Fudan University	Shanghai 200433 People's Republic of China
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9.2 Advanced Studies in Pure Mathematics, バックナンバー送付先

発送先	機関名	所在地
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9.3 Advanced Studies in Pure Mathematics, Vol. 46 送付先

発送先	機関名	所在地
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